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A tangled web: interactions and structures in university-school collaborations

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A tangled web:

Interactions and structures in university-school collaborations

by

Christina Pickerell Ohana

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in partial fulfillment of the requirements for the degree of

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Major Professor

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For the Major Program

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For the Graduate College

This dissertation is dedicated to

Margaret and Walter Pickerell

You have waited a long time to have an absent-minded professor in the family. The time has come!

and to

Heidi

With love and gratitude for her patience and sacrifice

and to

Andrew, Ren, Willey, and Maggie

I'm back!

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GENERAL INTRODUCTION

Rationale for Study

The relationships between universities and schools have become a prominent feature of the educational reform landscape. In the last decade, many universities and schools have created partnerships intended to improve teaching and research in the schools and universities (Teitel, 1994).

While the goal to link improvement of teacher preparation at the university with improvement of practice in the schools seems perfectly logical, it is beset with major obstacles. The universities and schools are different institutions with different cultures and missions. They are so different that university-school partnerships have been characterized as a form of "multicultural education" (Teitel, 1997). They have different values, norms, and missions that extend beyond logistical challenges, although these are daunting in themselves. University-school partnerships may be as likely to lead to a collision of interests and ideology as to collaboration. If not carefully planned and tended, these difficulties within university-school could lead to "separation, divorce or open marriages" (Teitel, 1992).

The difficulties in blending such different cultures often forces these projects to start, and often remain, on the margins (Darling-Hammond, 1994). While life on the margins can be exciting, it can also be dangerous (Sandholz & Finan, 1998). Danger in the university setting can lurk in faculty tenure and promotion policies, the allocation of resources, and access to resources. In the

schools, a project that is marginalized risks generating conflicting loyalties among the participants. In addition to internal problems, the district may not respect or understand the different needs of a school involved with a university. For example, they may assign or reassign teachers without appreciating the impact on the collaboration. This points to yet another problem of life in the margins. If major changes in leadership or participation occur, the whole project can be jeopardized (Lyons, Stroble, & Fischetti, 1997).

In this volume, I examine some of the structures and beliefs embedded in a university-school partnership. I describe, then try to untangle, the complex web of interests, ideologies, and information that participants, in different roles with different institutional backdrops, bring to the project. The care and feeding of university-school partnerships require a tremendous investment of time and resources. Therefore, it is incumbent on universities to research the effects of these programs on teaching and learning. Such research could inform both policy and practice. This volume represents my attempt to contribute to our knowledge of university-school partnerships as well as improve my own practice.

Dissertation Organization

This dissertation includes three research papers. Two will be submitted to professional journals. One has been accepted as a research monograph by the National Institute for Science Education at the University of Wisconsin, Madison. In the concluding chapter, I offer a general summary and conclusions.

Connections between university and field experiences are featured in the first paper, "Integration of Theory with Practice: A Comparison of Two Science Methods Courses." I studied the work of students in two science methods courses. One class was a preservice cohort involved in an experimental program with significant levels of field experiences. Their work was compared to students in the regular program who have only a modest field component. In this analysis, cohort students made many more references to their field placements than students in the regular program. Cohort students also used each other as sources of information and authority. At least initially, students in the regular program used sources from their university coursework to help them interpret their field experiences. They rarely mentioned their peers. These, and other, differences were interpreted in light of their meaning for efforts to improve preservice teacher education.

In the second paper, "Preservice Cohorts and their Implications for Mathematics and Science Education," I surveyed the literature on cohorts in preservice teacher education and educational administration. I also described the structure of three preservice programs at different universities that have mathematics- or science-focused preservice cohorts. While some progress is apparent, there are many areas which were unaffected by the new structure. There are also effects that may be undesirable. Both the literature and site visits highlighted the need for program developers in preservice teacher education to attend to both design and purpose.

The first two papers looked at preservice teachers as a specific component of a larger program. In the final paper, "Interests, Ideology, Information, and Institutions in a University-School Partnership," I examined the programs from a broader perspective. I used Weiss' (1995) model of interests, ideology, information, and institution (the "4 I's,") to examine how a university-school partnership links two very complex institutions. A case study approach was utilized to describe each of these factors in their institutional setting. I found that in order for the two institutions to work together, they must each accommodate the interests, ideology, and information of the other. This accommodation allows the two organizations to work together but prevents fundamental change from taking place.

In all three pieces, I was interested in the kinds and degree of changes taking place. The literature surrounding professional development schools suggested that a revolutionary change, a "simultaneous renewal," of teacher preparation was sought. Valli (1997) likened this to a second-order change in the terminology of Cuban (1988). A second-order change, according to Cuban, is one that involves the restructuring of the organization. A first-order change, by contrast, is a change that improves but does not radically alter, existing practice. At the most basic level, in each of these three papers I looked for evidence of change and its degree. Were we creating a second-order or a first-level change? Were we restructuring or re-shuffling?

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INTEGRATION OF THEORY WITH PRACTICE: A COMPARISON OF TWO SCIENCE METHODS COURSES

A paper to be submitted to Action in Teacher Education

Chris Ohana

Reflective practice has become an organizing principle for teacher education programs in the last decade (Valli, 1992). One primary purpose of reflection in teacher education is to promote the integration of theory and practice (Putnam & Grant, 1992). Reflection can help preservice students bridge their experiences in schools with what they learn in university courses. Two structures in preservice teacher education used to promote this reflection and integration of theory and practice are expanded field experiences and preservice cohorts (e.g., Applegate & Shaklee, 1992; Oja, Diller, Corcoran, & Andrew, 1992; Howey & Zimpher, 1989).

Teachers often cite field experiences as the most important feature of their preservice education (Conant, 1963; Cruikshank & Armaline, 1986; Rigden, 1996). Because of the value seen in field experiences, both teachers and teacher educators have called for an increase in the amount and quality of field experiences in schools (Holmes Group, 1990; Goodlad, 1990; McIntyre, Byrd, & Foxx, 1996). One important value seen in expanded field experiences is the opportunity it affords students to connect theory and practice (Daresh, 1988; Guyton & McIntyre, 1990; McDermott et al., 1995). Students cannot learn to teach through university coursework in isolation from work in the schools (Bryan &

Abell, 1999). Students need the opportunity through fieldwork to observe, practice, and reflect on what they learn in the university classroom.

Several of the same initiatives promoting expanded field experiences have also incorporated preservice cohorts (Holmes, 1990; Goodlad, 1990; NCATE, 1998). Cohorts, groups of students sharing coursework and fieldwork, encourage preservice students to negotiate the development of professional norms, offer mutual support, and encourage reflection on theory and practice (McCaleb, Borko, & Arends, 1992; Oja, Diller, Corcoran, & Andrew, 1992). Because of the intense relationships developed over time, cohorts may provide the opportunity for preservice students, teachers, and faculty to engage in more reflective conversations bridging theory and practice (Winitzky, Stoddart, & O'Keefe, 1992; McBee, 1998; Stoddart, 1993).

Cohorts and field experiences can serve to address issues in preservice preparation of mathematics and science teachers. Preservice teachers in elementary education often have negative attitudes toward mathematics and science (Raizen & Michelson, 1994). Most preservice elementary teachers take few college courses beyond the required survey courses; courses that are often taught in a dry, unengaging manner (Rutherford & Ahlgren, 1990; Raizen & Michelson, 1994). Preservice cohorts and expanded field experiences could serve to provide students with support, models of science and mathematics teaching, and a chance to apply their knowledge in a classroom setting.

Despite the enthusiasm toward expanded field experiences and cohorts, there has been concern that these structures may not lead to the intended

improvements in practice (Johnston, 1991; Zeichner, 1992; Owen, 1997). These reservations are not new. Fullan (1985) reminded us that field experiences can lead to an apprenticeship in which critical, reflective conversations give way to an image of teaching as a technical field. Berliner (1985) even suggested that early field experiences operate against improved practice by emphasizing technical skills at the expense of analytic development. As preservice teachers enter cooperating schools, they start to assume the professional norms of the school and teachers (Zeichner, 1992; Feiman-Nemser & Buchmann, 1986; Zeichner & Miller, 1997). The field experience may become an apprenticeship rather than a reflective, critical experience (Zeichner & Miller, 1997). While the research base on field experience is much more substantial than it is for preservice cohorts, many of the same reservations apply (Graber, 1996). For example, Koeppen, Huey, and Connor (In Press) found that preservice students in cohorts appreciate group membership and field experiences significantly more than students in comparison groups. But neither academic performance nor issues of collaboration were affected by cohort membership.

The mix of preservice students with expanded field experiences can create a tension between what is learned in schools and what is taught in the university. When cohorts are added to the mix, it can either serve to reify existing practice or support students to undertake the risky business of critically examining and connecting practice to experiences in schools and the university.

Purpose and Guiding Questions

The purpose of this study was to investigate the effects of expanded experiences in a cohort-based program. I focused on the connections preservice students made between university work in science methods and classroom field experiences. In particular, I was interested in how (and if) students perceived the connections between their work at the university and in the schools. Several questions organized the comparison of the two science methods courses.

> How do the preservice students connect university experiences with field experiences?
>
> How and what do preservice teachers learn from each other? Do the cohort members facilitate the translation between field experiences and the course?
>
> How do cohort and regular program (RP) students develop their concepts of science education?

Another issue emerged after the journals were coded and read. Many students mentioned enjoyment as the measure of a successful lesson. I compared student assumptions about enjoyment as a goal and an assessment in science education.

Theoretical Framework

Teacher educators have moved toward more reflection and critical analysis in preservice programs (Valli, 1992; Schön, 1983). This has led to programs that emphasize the development of reflective practitioners by designing "experiences in the field that enable preservice students not only to practice reflectivity but also to observe it being practiced by experienced teachers" (McIntyre, Byrd, & Foxx, p. 172). Similarly, Zeichner (1992) emphasized that field

experiences must recognize that learning to teach is a continuous process that does not end when the teaching license is awarded. The new field experiences need to be organized for a different purpose in order to contribute to this change in practice (Zeichner, 1992).

Although there are potential pitfalls in early and extended field experiences, there is also some promising evidence that early and extended field experiences can have a positive effect on teacher preparation when coupled with structures to promote reflection and critical analysis. Thomson, Beacham, and Misulis (1992) found a positive value for extended field experiences in an elementary education program. The program incorporated a reflective model to help a preservice cohort understand practice as well as professional development for the cooperating teachers. Other benefits of expanding field experiences have been reported. Reiman and Parramore (1993) found that expanded field experiences through tutoring and reflective journaling led to heightened understanding of the complexity of practice in mathematics and science education and sense of justice on the part of the preservice teachers. In both of the projects cited above, the early field experiences were one part of a re-structured program that assisted students, in cohorts, in becoming more reflective and analytical.

Lortie (1975) reminded us that preservice teachers have 13 years of experience in K-12 schools before they enter a teacher preparation program. Preservice teachers enter programs with a deeply embedded set of beliefs about what school is like. They are often placed with teachers who share those beliefs

(Goodlad, 1990). Since universities often have little control over student placement, students may be assigned to traditional teachers who do not reflect the practice desired by teacher preparation programs (Goodlad, 1990). If this is true, expanded field experiences and the support of the cohort may have a conservative effect on teacher attitudes. The cohort may have to negotiate its professional norms based on field experiences that bolster previous negative experiences. For example, Frykholm (1995) found that preservice mathematics teachers cited their cooperating teachers as the most significant influence on their teaching yet felt little or no pressure from them to design lessons based on the National Council of Teachers of Mathematics (NCTM) Standards. It was not surprising that though the preservice teachers expressed support of the NCTM Standards, Frykholm found that their lessons bore little resemblance to the types of teaching promoted in the NCTM documents.

Methods

This investigation is grounded in the theory of experience and education proposed by Dewey (1997). Learning is a constant negotiation between the experiences of the learner and what is to be learned. When new experiences are dissociated from previous experience, they become "fragmented" (Britzman, 1991). If the knowledge that preservice teachers have from experience is separate from their experience in, for example, a science methods course then the knowledge cannot be "extended or transformed" (Britzman, 1991, p. 35).

Learning to teach science involves understanding new ideas and experiences in light of other experiences.

The emphasis on experience, interpretation, and theory led me to employ grounded theory (e.g., Strauss & Corbin, 1998) as an organizing framework. Grounded theory is based on continuously generating and refining theory from the data (Woods, 1992). The reflexive nature of grounded theory was particularly suited to the complexity of the phenomena under study. The interplay of theory development and data analysis parallels the interactions of theory and practice that was the focus of this study. This made grounded theory both a practical choice and an appropriate theoretical model.

Program description

This study was conducted at a midwestern university that enrolls approximately 850 undergraduate elementary education majors. Most students go through a traditional program of courses. These courses progress from general social foundations, educational psychology, etc. to five methods courses. The methods courses are taught in two blocks in separate semesters. The regular program (RP) culminates with two sessions of eight week student teaching assignments.

The regular science methods course was a semester-long, 3 credit course. Students took mathematics methods in the same block. The students also enrolled in a seven week field experience for mathematics and science. Students spent about two hours a week in an elementary classroom and were expected to observe, teach a mini-lesson, write a lesson plan, and keep a journal of their

observations. Their field experiences were supervised by a field supervisor -- often a graduate student or retired teacher.

In contrast, from an applicant pool of about fifty students, thirty students were admitted each year into an experimental program, Learning in Context. . The partner schools and the university staff participated in student selection. Criteria included grade point averages, classes taken, and responses to an essay. The cohort students differed in some respects. First, they self-selected to apply. Second, the demands of extra field experiences and other meetings eliminated those who were non-traditional or transfer students. Perhaps because of these factors, cohort students, as I will describe more fully later, began to see themselves as "elite."

The selected students were placed in a cohort. The cohort students took their three years of education courses together and participated in early and extended field experiences at a partner school or set of partner schools. The intent was that the students become members and participants in the school community. The partner schools for the cohort in this study were two inner city, paired magnet schools. The schools were paired for the purposes of desegregation and they both designated science and mathematics as their areas of specialization.

The cohort students took four methods courses in one semester, termed "megamethods." Megamethods included science, intermediate reading, social studies, and mathematics methods courses. By the beginning of the megamethods semester, the cohort students already had about twice as much

field experience as the RP students. During megamethods, the gap in field experiences widened as the cohort students spent six weeks, full-time, in the field. The students had a variety of field assignments to complete while in the field. Most students, as well as their cooperating teachers, reported that this field assignment was much more like student teaching than a traditional practicum. The megamethods course had fewer class meetings than the RP methods courses but each class meeting was slightly longer to compensate. Unlike the RP methods courses, supervision of the students in the field was done by course instructors.

Although I taught both methods courses, I was much more familiar with students in the cohort class. In addition to teaching their science methods course, I taught science at the elementary school at which they were placed for field experiences and helped coordinate a grant that subsidized this cohort. Consequently, I knew these students for over a year before having them in a university course. I also knew the teachers with whom they were placed and had assisted in making student field placements. In contrast, I knew none of the RP students before they enrolled in my course and knew very few of their cooperating teachers.

Data collection

Journal entries from two science methods classes were collected and analyzed. One class was an RP methods course in which there were twenty-four students. The second class was a cohort course which enrolled 20 students. As part of their graded assignments, students in both courses were required to write

six field-based journal entries. The students in both classes received the same rubric that outlined expectations. Evidence of a discussion with a classmate, teacher, or professor was required for full credit. The journals addressed topics from the methods course in light of classroom practice. The journal questions dealt with issues of equity in the classroom, the nature of science evidenced in the structure of the science instruction, as well as various pedagogical issues such as questioning strategies and assessment. Students were also encouraged to design their own questions or write about another issue. Journals questions were introduced in the third week of class and had to be completed before finals.

Other sources of information were used to corroborate data from the journals. I looked at course evaluations from both classes and their final projects, a science unit for an elementary classroom. I also had informal observations of classroom discussions and my notes on the class as a check. I had additional sources of information from the cohort. As part of an experimental program, they participated in periodic surveys, focus groups, and interviews.

Data analysis

As I read the journal entries, I identified categories as they were suggested by the data. Examples of such initial categories are "discusses texts" or "discusses methods course." This process is identified as "open coding" in grounded theory protocol. I chose a category that had a high priority (I started with "connections to university"). I then read each journal entry and placed any comment into this category that spoke to it. I then followed with each category until all comments had been placed. After reading and sorting the journal comments, I examined

the material to discover patterns. For example, in comments about cooperating teachers, responses fell into different piles. Some were positive and treated the teacher as an authority. Others were critical. Then I identified the entries by group in order to determine if there were any consistent patterns of differences or similarities between the cohort and RP classes.

My first discovery emerged before I ever analyzed the data. I had originally tried to code the journals so that I would not know the identity of the student as I read it. My logic was that I did not want my opinion of the student to flavor my interpretation of his/her journal. I found as I read the coded journal entries that I knew the cohort students and their participating teachers so well that disguising their identity was not effective. I knew who was writing and I recognized their classrooms. By contrast, I only rarely could identify students in the RP course. The preservice program dedicated a significant level of faculty involvement to cohorts. The cohort students were much more familiar with the university faculty than the traditional students. An informal "cohort" of professors had RP contact with the cohort since their sophomore year. These same professors worked with the schools in which the cohort students were placed. The RP students rarely enjoyed this type of familiarity.

Validity was established in several ways. The research questions drove data collection and analysis. Since the overarching question concerned the effects of expanded field experiences on connections made between university and school experiences, I chose two groups to compare. One group was a cohort and had expanded field experiences. The other group had only modest field

experiences. I chose data sources that could logically be expected to yield information about work with colleagues and the field. Students' journals were a primary source of information because the purpose of the journals was to encourage students to make these connections. Other sources, like units, were consulted for verification, clarification, or refutation. I played the data not only against itself but also held it up to what other researchers have reported. Finally, I tried during the analysis and writing of this paper to be aware of my own values.

The purpose of grounded theory is to generate or refine theory (Strauss & Corbin, 1998; Woods, 1992). Therefore the process should result in some capacity to predict or explain. It should be consistent with both other professors' experiences with this cohort as well as consistent with experiences at other universities. I have had the opportunity to speak with professors at six different institutions. In each case my findings are compatible with many of their experiences. This work is also consistent with, and extends, published research on field experiences. In order for others to extend or repeat the results reported here, I have kept records and copies of my protocol and analysis.

Interpretation

Several themes emerged as I analyzed the journal entries. Although several of the themes are connected, they are separated here for the sake of analysis. The journals revealed very different patterns.

General Aspects of the Journals

In each class, I emphasized that the journals should not be merely descriptive of a classroom or lesson but should include reflection and analysis. The analysis should include components of the course, field experiences, and relevant personal experiences. I stressed that the journal entries should be discussions of a topic and not simply descriptions of a lesson. I looked for evidence of analysis from the students. Evidence of analysis included such things as discussions of connections of the field experience, personal experience, or the methods course. Analysis might also consist of a discussion of the consequences of a certain lesson or teacher action. After re-reading the journals, I did not detect any clear difference between the level of analysis of the two groups. I was surprised by this result. I predicted that the cohort students would include less analysis. It was my perception that the cohort students included more description than reflection. This was not the case. The entries from the cohort were more field-based but they included elements of reflection about their field experience. The reflection was based on a different knowledge-base, however. Cohort students focused on their peers and comparisons with other field experiences. RP students included more references to the course and prior experiences.

I provided a list of fifteen question on which students could write. These included many topics such as questioning strategies, examples of inquiry in the classroom, differentiation, and other science methods topics. Recognizing that classroom observations may not fit neatly into any single category, students were

also encouraged to create their own topic. A variant of this last option, which I called "field-based," was characterized by a discussion of a field experience that did not include any specific mention of the methods course.

Although the degree of reflection characteristic of the groups was similar, they chose different topics about which to write. Given the differences in the nature of their field experiences, these differences were not surprising. The RP students wrote more entries along the traditional topics. Several (eight) wrote reviews of a text chapter. Six of the RP students wrote a definition, analysis, and application of scientific literacy. Eight RP students developed their own professional development plan. None of the cohort students chose any of these options. The cohort students chose more field-based topics. For example, seventeen of the cohort students wrote about safety in the classroom but only one RP student chose that topic.

A teacher, whether at the university or in an elementary classroom, hopes to see growth and change in the students over time. I looked at the students' journal grades and attempted to discern trends during the semester. Students were graded on 5 factors: 1) connections made between to class discussions, 2) connections made to course readings, 3) discussion with a colleague, 4) connections to field experiences, and 5) connections between the first four. The scores on the journals of the RP students did improve over the semester. Grades from the first half of the RP class were lower in the first half than in the second half. The length of the entries in the RP class also grew by almost fifty percent. These trends were not evident in the cohort class. The scores and length of

entries were virtually unchanged, even declined slightly, in the second half of the semester. The class seemed to have more of an impact on the RP students than on the cohort students. This was supported by their unit assignments. Students in both classes wrote science teaching units. The RP students attended more to the specific rubric I provided. They had clear sections that addressed pieces of the rubric. They had lessons representing different lesson formats. They developed assessments in concert with assessment ideas expressed in texts or in the class. The cohort students wrote up units that they taught in their field assignment. Every one was a variation of a district or school unit. Their units were difficult for me to grade because they did not include broad areas in the rubric. They lacked assessments or had a single form of assessment for an entire unit. They used the same lesson plan format for every lesson in the unit rather than varying the style. In my class notes for the semester, I wrote a pessimistic note concerning their units, "Did they learn ANYTHING?"

The length of the journals differed between the two groups. The RP students submitted journals that were, on the average, almost half a page longer than those from the cohort students. The RP students' journals also had a wider range in page length. Some students submitted journals that were less than half a page long. Several RP students averaged over 3 pages per journal. The range was more constricted with the cohort students, from 1/3 to one page.

A primary purpose of this study was to investigate the impact of extended field experiences on a cohort of preservice teachers. In particular, I was interested in the connections made between university coursework and field experiences.

The rubric for the journal assignment included a section on making connections between the practicum, course discussions, and the readings.

Students in the cohort made dramatically fewer references to the university course. Only three out of the twenty-one cohort students made any reference to the course readings or discussions in any of their journal entries. When cohort students did mention the readings it was often generic and lacked specificity. "I have completed various readings and taken part in classroom discussions about process skills. These components will surround my observations of the most prominent process skills in use by the students." The student makes a vague reference to a course topic (process skills) but there is no supporting detail. The student continued on in this entry to write about using the "scientific method," which was neither defined nor a process skill.

In contrast, all but four of the RP methods students included references to course readings in their journal entries. While the cohort students did not mention the course, the RP students did not incorporate field experiences into the journals. Almost half of the total journal entries from the RP students lacked any obvious mention of the field experience. They described and discussed a topic from the readings or class discussions but did not apply it to the field. Some RP students shared a version of this difficulty: "My teacher only teaches science one semester. And this is not that semester." It is a constant problem with field experiences for elementary science methods: Many teachers do not teach it or teach it strictly from a textbook. Many RP students came to me

worried about the journals because they were not seeing science in the classroom.

The resulting journals may be reflective of the material presented and may have been discussed with a fellow student, but classroom application was absent. For example, "I was glad we learned some ways to approach prior conceptions in class today. I was shocked and dismayed by the video [Private Universe]." This student continues, in the same journal entry, to weave together readings, the discussion, and some personal experience but she does not include a field observation. With approximately 14-20 hours of field experience combined for mathematics and science, many students were lucky to see two lessons in science. They might fail in making connections because they have very few experiences to connect.

Professional knowledge

A goal in the science methods course was to have each student grow into a sense of themselves as a professional. Their professional knowledge was mediated by a number of factors such as their experiences in schools, in the university, and with colleagues. The sense of professional knowledge exhibited by students in the two groups was different.

Previous experience is known to be a significant factor in the development of professional knowledge (Bryan & Abell, 1999; Pajares, 1992). Personal history and previous science experience was a prevalent feature of the RP students' journals. RP students made frequent mention of their personal experiences with science in school. Some of these were positive. "Unlike a lot of people in this

class, I always enjoyed science.... With any luck, I may be the teacher to change the minds of my young students [about science]." Another student commented, "I was the kid who came home and re-did experiments at home from science classes. I have always been a person who is interested in learning about anything and everything." Other students found that their own experiences did not measure up to current standards, "I feel cheated. Why weren't we taught this way? I used to think science was *boring* .[emphasis in original]." Another student added, "I am finding this class very interesting, and I am thinking to myself, why didn't I like science?" Whether RP students had negative or positive experiences as a child, they compared these personal experiences to what they learned in the science methods course.

In contrast, cohort students rarely mentioned previous experiences. Perhaps the RP students, lacking extensive field experiences had to interpret the class through other experiences -- in this case their previous science classes. The cohort students, with six weeks of full-time field experiences in this semester alone, had a reservoir of experiences in schools from which to draw.

The development of professional knowledge hinges on the ability to analyze practice. While the analysis does not have to entail criticism, seeing weaknesses in current practice might be an initial step toward professional knowledge. Preservice students do not always work with teachers who model practice as advocated in university courses. The preservice teachers are left to compare what is promoted in courses with what they see in the field. This turns many preservice teachers into critics. The students in the RP methods were no

exception. For example, one RP student wrote, "I was very disappointed to find that after spending so long on landforms, their teacher had such low expectations for them. Mrs. Smith made them take a multiple choice quiz. I thought the project form of assessment that you talked about would have been better." Students recognized the texts, course discussions, and me as authorities to support their criticisms of the classroom teacher. Amy, a student in the RP program, participated in an afterschool science practicum at a middle school. Since I ran a similar practicum at another school, she asked me how I organized it. This fueled her dissatisfaction with the structure of her own field experience. "When I discussed with you [me] how your after-school club was directed and arranged, you explained three types of activities and what you want out of both your students and the preservice teachers. This told me that there could be structure to the whole affair, without turning the time into a regular classroom experience." The RP students felt the standards of the texts, classroom discussions, and me, provided a yardstick by which they could judge their classroom observations.

I had expected that cohort students might be less likely to criticize their cooperating teacher for several reasons. First, the cohort students knew that I worked with their cooperating teachers. I did not think they would offer criticisms of a teacher to a colleague. Second, I assumed that a close working relationship would bond the cohort students with their cooperating teacher making them reluctant to offer any critical reflection. This proved not to be the case. Students in both the RP and cohort classes seemed free to criticize their

cooperating teacher. For example, "How is this [lesson] helping the students? I talked to Sarah [another cohort student] and we both felt that there is a lack of assessment in both our classrooms." Sometimes the criticism took the form of advice. "On Friday our class visited the Botanical Center with the other third grades. I think our third graders enjoyed it but could have gotten more out of it with a little advanced planning from the teachers." I felt awkward, and surprised, when cohort students presented me with information that was critical of the teachers. The cohort students may have seen the university and schools as so separate that they had to consider me as one or the other, but not both. Since I taught at the university and worked closely with the grant as part of my job in the schools, the students placed me in the university camp.

A common tension in elementary classrooms results from the noise that can come from active, enthusiastic children (Windschitl, 1999). Some RP students commented on these management issues. They worried about having active science lessons that conflicted with traditional notions of a well-behaved class. One student seemed proud of her noisy lesson. "[After teaching her own lesson] my teacher's only suggestion was to keep kids more quiet.... I personally think the chaotic environment frightened her!!" Others, though, were uneasy about classrooms that became noisy. "How can you stand the noise? I'm afraid I'll lose control [of the class]." Although management issues were not usually the focus of an entire journal entry, they were sprinkled liberally through the classroom observations. The cohort students provided a dramatic contrast. No cohort students expressed this concern. Occasionally they mentioned a noise

level or a hyperactive class but not in the sense that it was alarming or unmanageable. They did not appear fearful or tentative about management issues. This was also reflected in their units. The RP students had more elaborate plans. The plans included plans to "manage" the materials or children. The cohort lesson plans were skeletal. They usually presented just an outline of the major events in a lesson. In their focus groups they mentioned the lesson plans of teachers -- which often are nothing but page numbers and topics. They did not include details of management. I shared this observation with a cohort student. He responded, "Management is the same for all the subjects. It becomes kinda second nature. You don't need to keep writing it down." Through experiences in the schools, students became more comfortable and thought of some issues, like management, as routine.

Professional knowledge should also include a critical analysis of the university experience. I hoped students would also offer a critical analysis of the methods course. I tried to make students feel safe in analyzing my teaching by offering self-criticism and occasionally assigning group tasks to critique my lesson. I hoped this would provide some safety in numbers as well as model constructive criticism. As part of my effort to encourage reflection and analysis, an option for the journal was to critique one of my lessons. No students, RP or cohort, selected that option but a few students did offer some critique as part of other entries. The only students who did so were RP students. For example, "I'm not sure that this lesson [in methods course] was scientifically rigorous. I found myself doing whatever I needed to do to make my structure the tallest.... I

started missing the point." In addition to commenting on lessons, some RP students took exception to a few of my comments. Many of these disagreements were about my cautions about curriculum integration. "[responding to my criticism of thematic integration] I think thematic integration is a good idea. I talked to my coop about it and she agreed. You have to be careful, though. It has to be real integration -- not like some of those lame ideas in the [text]." This student offered a brief, if tentative, rebuttal to what I said in class. The style of her comments was similar to the other few samples of disagreements: brief and specific.

I was surprised, and admittedly relieved, that the cohort students did not become critical. Several faculty members who had taught cohorts in the past warned me: Cohort students chew up professors. I was prepared to develop some thick skin but it proved unnecessary. The cohort students focused their journals on classroom practice. In hindsight, this might have been predictable. Cohort students did not use the course as a reference. Their interests were with their field experiences and not with courses at the university.

Both preservice groups were willing to criticize their cooperating teacher. Some of the RP students were also willing to criticize my practice. In either case, they witnessed a tension between what they believed to be good practice and what they witnessed in their field experiences. RP students tended to cite examples from courses, professors, or texts to substantiate their criticisms. For example, Pat consulted a university professor about a student in her practicum. She used this consultation to verify her hunch that this student with behavior

problems was gifted and bored. Together they debunked the diagnosis preferred by the teacher -- that the student was a spoiled brat. RP students were particularly critical of the questioning and testing strategies of teachers and districts. They used the science standards, class materials, and texts to highlight weaknesses in the classroom.

The one cohort student who consistently used the text or course to critique her classroom experience had an unfortunate placement. She was placed for her methods field experiences with a teacher who was thought by many to be weak. The cooperating teacher was very traditional and a master of worksheets. The placement was made to appease the teacher who consistently asked for a student teacher but was continually denied. Fortunately the cohort student was able to make some critical observations such as, "From [course text], it mentions that questioning and questioning techniques influence learners' science achievement, attitudes and thinking skills. In this case, the students are being influenced in a negative way." The same cohort student also used me as an authority as well as comparisons to her cohort colleagues' placements. She may have referenced the methods course so much because her experiences in the classroom were so weak that she had no other reference.

An unannounced guest made an appearance in many of the RP class journals. Some students compared what happened in their practicum to what might happen with a "real scientist."

> ... the teacher upon noting that several of the powder and crystal tests were not turning the color specified in the manual, quickly stated that the tests were "wrong"... she quickly gathered the materials...Although this

> moment would have been very disconcerting for me as it would be for any teacher, but this was a moment upon which to build real science skills...inconsistencies are not an ugly stepsister. THEY ARE WHAT REAL SCIENTISTS DO [emphasis in original].

These students thought of scientists as authorities for professional knowledge in science teaching. The RP students made more use of information from outside the classroom, whether it was from me, the texts, or "real scientists." Other sources of authority are not usually present in the cohort journals. They centered their reflections on experiences in the classrooms. This was supported by cohort focus group data in which cohort students value field experiences more than anything else in their program.

One of the themes to emerge as I read these journals concerned a focus on practicality. Teachers do things (sometimes reluctantly) because they been told to, because of time constraints, or because of behavior management issues. While both groups included passages related to practicality, the pattern was different. The cohort students, who have already spent considerable time in these schools, jumped in from the start with examples of making pedagogical decisions based on expedience.

> In another part of the lesson the students are to squirt 25 ml of water into a vial. Mrs. Carlson and I decided to do this ourselves, not only because it would save time, but we were afraid the students in our class might squirt each other (We have a very hyper class!). I think this was a good decision because Friday quite a few students were fighting with each other.

This cohort student, together with her cooperating teacher based an instructional decision on behavior management and saving time. Other issues like safety came up in the cohort class. "[Worry about safety in dissecting cow eyes].... We

thought that this solution [prosecting the cow eyes] to our safety problem enabled students to see the eyes close up without a scalpel in their hands." The instructional decision was based on a concern about safety and behavior, not on the educational value of the options.

The RP students started making the same types of decisions but only after spending more time in the field. For example, Jennifer started off the semester espousing the "make it fun" theory of science education: "To keep students interested in science, give them fun, hands-on activities. If you have fun with science, your attitude will rub off on the kids." Later in the semester Jennifer's faith in students and fun was shaken after experiencing defiance, disruption, and distraction in science class: "Ms. Webster [her cooperating teacher] and I talked a bit. The conclusion came [sic] to was that you can't force them to behave and learn, just control them so they might." Her objective shifted from making science fun to one of controlling her students.

Another RP student wrote an early entry expressing faith in the learning cycle of exploration, concept development, and application only to later decide that lecture was important because "it helped the students know what they were looking for." Students in the RP course increasingly viewed the cooperating teacher as the authority. One student liked a video in class of an authentic assessment of a chemistry unit "but I wanted to get a 'real' teacher's view on the this subject. So I asked my classroom teacher, who said 'Yeah, its a great idea but who has the time?'" The RP students started to look a little more like the cohort students as the semester progressed. They started to view experience and the

cooperating teacher as the primary authority and started to make decisions based on practicality.

Sometimes practicality evolved into making "teacher tips." These were suggestions, often technical or management-related. "First we had to collect all the permission slips. This was not as easy as it should be. Then there was preparation for lunch. What if a student wore their swimsuit to class and didn't bring an undergarment for after swimming?" In another case, an instructional strategy, questioning, became a tool for classroom management. "Questioning kept the students' attention and kept their minds off the gross part [dissecting lungs] of the lesson." Cohort students spent so much time in the classroom that they saw a need, as many teachers do, to streamline or make things more efficient or safe. They started to anticipate management problems. RP students did not incorporate these practical suggestions in their entries.

The cohort students also started to engage in "teacher talk." They learned code words like "1800 Grand" which was the address of the district administrative offices. They mentioned the district criterion-referenced tests and where they were scored. Cohort students talked about the fire evacuation routes, field trip procedures, and a hepatitis scare in the district. They mentioned specific students, their needs, and abilities. The RP students did not have this type of conversation in their entries.

While some of this "teacher talk" might appear trivial, it signaled an important factor in the professional development of preservice teachers. The cohort students began to feel a part of the school community and started to use

the language and knowledge of the community. While the knowledge was not always hugely significant, it might have led to more sophisticated interpretations of the functioning of the school. For example, one student noted that although the school was a science magnet school,

> The science curriculum has taken a back burner in [school].... I asked my coop about this and she agreed. Science is not a focus for her. The Living Lessons [a thematic science program] do not seem to have much emphasis either. There are lessons every once in a while but this only happened once in my six weeks --- and I taught the lesson.

This student observed that while the school had some of the trappings of a science magnet school, science was not a priority for the school. Cohort students can make these observations because of the volume of time they have in the schools. RP students did not have enough consistent time in the schools to detect such patterns.

Cohort students became proprietary about their placements. Their language extended beyond "my co-op" to references to "my class" and "my students." RP students spoke about their cooperating teacher but never referred to the class or its students as their own. The cohort students became a part of the classroom and the school communities. They had field experiences at the same schools for three semesters prior to the methods semester. The RP students were never more than visitors in their field placements. They had little more than a "drive-by" field experience. RP students did not have the opportunity to feel part of the classroom.

Conceptions of science teaching

Many students in the RP class wrote that they changed their conceptions of science and science education based on their experiences in my methods course. One RP student proceeded with a lesson even though she feared her supervisor would not appreciate it: "I ventured into the unknown anyway... relying on the information from this class to assure me I was doing the right thing!!" In their journals, the cohort students did not report this course as a challenge to their previous conceptions. This was supported by their end of course evaluations in which they appreciated lessons and enthusiasm but did not mention wrestling with change in their views of science teaching.

Students in the RP section sometimes used the journals as an on-going dialogue on science teaching. For example, Jennifer found a section in the National Science Education Standards (NSES) to be daunting: "Reading through the NSES section on planning was scary. I've watched enough teachers in the classroom to know that this is not how teachers plan." She temporarily resolved this tension through her involvement in methods courses: "Early in my preservice career, I would not have felt comfortable doing this [amending a lesson plan midstream]. I believed those nine point lesson plans were scripture and a teacher could be shot on sight for straying from them.... Luckily, I have had some awesome methods professors that have changed my attitude completely. I now view them [plans] as a necessary evil..." But later in the same journal entry, she had already started to move towards practice as she observed it in the classroom. As she discussed lesson plans with her colleague, they were not sure

how useful plans would be. "None of our cooperating teachers have ever used lesson plans and they don't seem lost or confused... I have even seen inexperienced preservice teachers teach tremendous lessons using only a post-it note... The only practical use in the future I can see for lesson plans is for substitutes." In one entry, lesson planning evolved from scripture to a "necessary evil" and finally to something that is done for the sake of substitutes.

Some RP students reported the methods courses to be a transformational process. They reported that their own school experiences were nothing like what they learned in methods. Methods classes changed their conceptions of teaching. They were more motivated to teach science and more confident than they felt at the beginning of the course: "I know that by simply involving myself in this class, my enthusiasm for science has grown because your enthusiasm is 'catchy' and your justifications for learning science are very motivating." Some students got angry about their previous experiences in science: "I always wonder what my life would be like if my classes had been taught in the same fashion our methods teach us to do it."

While not all students reported a profound transformation, others still found components of the methods course to be a challenge to previously held beliefs.

> I found it very interesting that you said you have rarely seen a thematic unit done well...I have always been a big fan of thematic units...however, as I listened, I understood your point...but I have seen a thematic unit on medieval life that was very interesting and informative. I wonder if there is some better way to teach them so that there is no 'subject snubbing' [emphasizing one content area and trivializing others]? Could we teach teachers to teach them correctly?... I discussed this with a few classmates

> and they were surprised at your [negative] tone but could also understand your point...so maybe you are right. [She remarks on realization, that classroom teachers seem to be using them less] I think its too bad though, because thematic units are sure a fun and natural way to teach.

While she was not necessarily re-evaluating her overall view of science education, she was re-thinking the value of one aspect of science teaching.

In both cohort and RP classes, students gave considerable attention to personal thoughts and opinions. Texts, courses, and classroom observations are often used to substantiate previously held beliefs. For example, Andrew (an RP student) stated that "students learn best from each other," but offered no other evidence to back up the claim. Andrew also "really like[s] the way this class teaches us to teach science, " but again, the statement is not supported by any combination of experience or research. He continues with an assumption about how students will learn or enjoy science. "One of the hardest things about teaching science is, in my opinion, overcoming students' preconceptions. Students, and teachers, bring their personal experiences into the classroom." This conclusion, however positive, lacks connections and supporting detail. Other students used similar types of phrases such as "I think students learn best when..." or "...hands-on lessons help the students remember and enjoy science." They often stated what they thought but not why.

Cohort students based their conceptions of teaching on their field experiences. For example, Jody stated, "While talking to Erica [her cooperating teacher], I learned a lot. Teachers have to teach, be counselors, dry tears, help heal the cuts, and motivate the students." In a similar vein, several cohort

students mentioned teaching as a continuing learning process -- specifically of learning from children and from practice. "The students inquired about things that I, as an adult, overlooked, but their inquisitional [sic] minds sought answers for. This allowed me to learn things that I might have never known if I hadn't shared this time in second grade." They often mentioned how much they learned from children. "I discussed this [questioning strategies]with Erica [her cooperating teacher] because I was in awe of the questions she asked her students. She told me it comes with practice." The cohort students tended to be more specific about their evolving conceptions of practice. These ideas grew from experience.

There was some suggestion that students from the two groups develop different levels of confidence about their ability to teach science. Cohort students rarely expressed doubts about their ability. In fact, they sometimes offered the classroom teacher suggestions. "Going into the lesson I felt it was very unstructured and students were confused about how to fill out the worksheet.... I felt that in restructuring the lesson, I would have seen more interest among the students and better behavior control." The students seemed secure that they knew what to expect in a classroom and that they could handle it. In their six weeks in the field, many had responsibility for the class almost as much as a student teacher. They knew they could handle a class because they had.

RP students expressed more doubts. They were more open with their fears and sense of inadequacy. For example, Terry remarked that "I don't know where to go to get lessons that go along with the Standards or Benchmarks... I don't

know if my district will have set Standards. Right now I hope it is all spelled out for me so I don't have to choose." Another RP student was comforted to know that science is a search for knowledge because she felt that her content preparation was "supremely inadequate." Wendy, discussing rubrics, wondered, "Who am I to come up with a perfect answer? As a teacher I don't know exactly what I want." RP students had very little experience in the class. They had almost no time to have a class on their own. A few taught a whole-class lesson but more often they only had the chance to work with a small group. They also did not know the school or each other very well. They did not know where to go to get answers or support.

The interpretation of this difference in confidence is complicated. As the cohort students completed student teaching, three cooperating teachers told me that their cohort students admitted that they never intended to teach. The students realized this during "megamethods," the semester from which these journals came. I returned to these students' journals and could not find anything in them that expressed doubt or a lack of confidence. In fact there was nothing obvious in common among these three students. One was among those with the highest grades, one among the lowest, and the third was in the middle. Since the cohort was so focused on teaching, these students might not have felt comfortable expressing doubts. No one wanted to stick out in the group.

How and what preservice students learn from each other

The cohort students spent three years together. They not only took all of their education courses together, they also did their practica in the same schools

at the same time. They spent more time with each other than with faculty at the schools or in the university. They also traveled together in a van for the forty minute drive from campus to the schools. I therefore expected the cohort students to make more references to their peers. Cohort members did mention fellow students much more often than did the students in the RP class.

Students from the cohort described a variety of interactions with their peers. There is a strong tendency for cohort students to use each other as experts. They helped each other interpret their experiences. They talked to each other about mundane things such as whether to use food in a classroom or more delicate matters of assessment and teaching. This is supported by other data. In focus groups the cohort students consistently cite each other as support for their positions. They seemed to accept what their colleagues said even when it violated what they heard at the university or even from classroom teachers. The value that they held for each others' opinions did not extend to the whole cohort, however. There was a significant level of distrust and bickering between cliques within the cohort. Students generally, but not always, used other students within their own clique to discuss journal entries.

Several times, cohort students spoke of planning together, often on the daily, eighty mile van ride. Since the two cooperating schools consisted of a paired preK-2 school and a 3-5 school, the passengers in the vans were segregated by grade level. There were often several students in each van who taught the same grade level and the same units. This gave them a chance to plan and compare notes. There were numerous mentions of the van ride in the journals.

Students in the cohort appeared to need materials from their methods courses corroborated by their peers before they accepted it. In one case, a cohort student said she heard a great suggestion. A fellow student told her that she wrote her questions for a lesson on an index card and carried the card with her. This tip from a peer made a much bigger impact than the fact that I carried an index card full of questions with me in each methods class and recommended the habit many times over the semester. Two other cohort students discussed hands-on science lessons, "I discussed this with Wendy in the van because she had mentioned the need and value of hands-on activities. We both feel that these activities are *essential*." Kelly did not mention discussions of active science in the methods course, but she valued her peer's opinion of them. Peer opinions carry considerable weight in the cohort.

There were few references to peers among the RP journal entries. Most never mentioned a peer. When RP students did speak about their colleagues, it was not always in a positive light. They complained of rude behavior in class or of ignorant or lazy students in their cooperative groups. On reflection forms for a unit assignment, several RP students mentioned the value of working with a peer. Several took comfort in the knowledge that others in the class shared similar problems and fears. For the most part, though, this class seemed to be experienced individually by the RP students.

Enjoyment

One issue that emerged as I read the journals was the preservice student belief that a primary objective of a science lesson should be enjoyment. As this

theme took shape, I thought it might be more common among the cohort students since they spend more time in the field. I assumed that as the preservice students taught more, they would increasingly value student satisfaction. This was not the case. Both RP and cohort students valued fun lessons as a goal from the start. In my methods class, I neither discouraged people from enjoying themselves nor presented "fun" as a goal. This fun factor emerged in the early journal entries and was not extinguished as the semester progressed. Students in both groups believed that the lesson went well if it was enjoyed. A cohort student wrote, "This lesson went so well - the kids just loved it and the cooperating [sic] teacher asked for a copy of it." One RP student even valued enjoyment over learning, "The greatest part about these activities is not that they teach about the environment, but they are fun and engaging." Sometimes the cooperating teacher reinforced the fun factor. "[After a lesson in which kids cut food pictures out of magazines], Mrs. Anderson agreed that this was a very good lesson hands-on lesson. The kids really enjoyed it." This theme carried over to the student lesson plans in which observation of student enjoyment is offered as a primary assessment criterion. Enjoyment was valued over learning. Apparently students enter methods, and perhaps education majors, with the notion that the teacher's job was to make learning fun. It may be that students decide to become teachers because of a teacher they thought was fun. Perhaps popular culture might reinforce that idea through television shows. Whatever the reason, students wanted to make their lessons fun.

Discussion

The most striking difference between the two sets of journals is in the references to the course. Students in the RP methods courses made many more references to the university work than the students in the cohort groups. Almost all of the RP student journals contained an analysis, albeit not always a profound one, of a topic in the methods course. The students in the cohort group included little mention of a methods discussion or reading. Conversely, students in the RP course included far fewer references to their field experience. They wrote many entries that were without any connection to a specific field experience. Neither group, then, was consistently making connections between field and course. The cohort students were more practice-based and the RP students were more course-based. The bridge between theory and practice was not built in either case.

This basic distinction flavored other aspects of the journals. When students in the RP course saw a discrepancy between what they learned in methods and what they witnessed in their field experiences, they often used the course material as the authority or lens through which they characterized practice. The cohort students did not. They more often used each other as the authority in such matters. They were just as free in their criticisms of classroom practice as the RP students but instead of consulting theory for clarification or interpretation, they went to their fellow students.

Since the cohort students did not use the information in their journals to interpret practice, it is not surprising that they did not indicate that the course

changed their conceptions of teaching or science. Many of the RP students suggested that the class changed, in some cases dramatically, their ideas of teaching science. The cohort students seemed to emerge from my class unscathed. This conclusion is bolstered by the anonymous end of term course evaluations. While my numerical scores were almost identical in the two classes, written comments were quite different. While the cohort students appreciated my teaching, it was only in the RP students' evaluations that the course was reported to be a class that dramatically changed their perceptions. The lack of importance that the cohort students place on the course, aside from bruising the instructor's ego, is troubling. Elementary education students often have a constricted or negative view of science. Since they might not be placed with a teacher who appreciates (or even teaches) science, this course is one of the last chances to change their conceptions of science and how it can be meaningfully taught. The cohort students, focusing on other matters, missed this opportunity.

Despite some of the negative outcomes of extended field experiences, there are also some positive results. Cohort students wrote as a member of the school community. They often referred to "my class" or used teacher jargon that was absent from the RP students' journals. They became part of the community. As part of the community, some of them discerned patterns of practice that were troubling, especially the opportunities missed by the students in special education programs. They also caught discrepancies between what they thought the school should look like, as a science magnet school, and what the students

saw. These observations were missing from the RP student entries even though some of them were placed in the same school as the cohort students for field experiences.

In addition to learning about the school community, cohort students also learned to work with colleagues. Their progress was not made easy due to the numerous cliques within the cohort. Other professors noticed these cliques and commented on them in planning and in focus groups. The students recognized it in interviews, informal conversations, and focus group transcripts. The cohort members talked about getting along and the shifting cliques within the group. The cohort students made a steady stream of comments concerning planning together, verifying each other's hunches, and asking each other for advice. They constantly used each other as a sounding board. The RP students rarely mention each other and apparently do little planning together beyond an occasional assignment. The cohort students are members of the school community as well as bonded with their peers. RP students have neither of these supports.

The fact that "my" students missed opportunities provoked substantial reflection on my part. I was serving both as teacher and researcher. My work as a researcher prodded me to examine and change my own practice. This became, in part, an action research project. I had started the project as an attempt to determine what effects cohorts and field experiences have on student understanding in a methods course. The units of study, as I initially conceived them, were separate or external from me. As I started to analyze materials, they became internal. Whatever failure the students experienced became personal

because it was part of my job to lead students to these connections of the field with the university. As a result, this project has informed my own teaching.

My "dual citizenship" brought other tensions. Wong (1995) described two areas of conflict for teacher-researchers. The first arises from the needs of a researcher to be systematic and avoid intervention. This was not a problem for me because I did not analyze the journals or other materials as I taught. I waited a semester before analyzing them. Just as Wilson (1995) and Baumann (1996) suggested, my practice improved as I analyzed the data. The second conflict was more problematic. Wong saw an inherent conflict of conduct. It was a moral dilemma to simultaneously teach and research because it caused him to choose between two competing tasks. In my case, the dilemma was more directly caused by the unease with which I had access to teachers' classrooms. Students were open with criticisms, and compliments, of their cooperating teachers. I knew many of them, some as close friends. Teachers work in an isolationist culture with considerable autonomy. It was an ethical dilemma for me to have what we, as teachers, might consider private information. This was a conflict with both my teacher role and as a researcher. As a teacher, I needed students to tell me what their experiences were. As a researcher, I needed to analyze it and make it public. Both of these conflicted with a third role -- as a colleague in the schools. This conflict was more difficult to reconcile. In an age of professional development schools and clinical faculty appointments, it must be addressed or there is the danger of losing that which is most valuable in a collaboration: trust

Implications

Several assumptions are embedded in efforts to expand preservice field experiences and implement cohorts. First, early and extended experiences, when coupled with reflection and analysis, may help preservice students integrate theory with practice. Early and extended field experiences become a realistic context in which preservice teachers come to understand and practice the profession they will enter. Second, cohorts allow students to practice this reflective activity in a supportive, learning community. Based on these assumptions, this university has maintained a "context-focused" professional development project for the past six years. The cornerstone of this program, Learning in Context, is an intense and early initiation of cohorts of preservice students into field experiences. The students, spending three times more hours in the field than those in the RP program, graduate from the program with an extensive array of experiences in the classroom.

The increasing popularity of cohorts (AACTE, 1991; Howey, 1994) should encourage preservice educators to examine how and what preservice teachers learn from each other. Yet Hawkey (1995) suggested that we know very little about this dynamic. The results from this paper and others (e.g., Koeppen, et al., In Press; Wiseman & Nason, 1995) suggest that the injection of a cohort community into the preservice program changes what and how preservice teachers learn from each other. It also introduced a host of complications. Issues such as relationships to the school culture, personalities, and gender differences muddy any attempts to make recommendations on the structure of preservice

teachers' collaboration or their field experiences (Hawkey, 1995). These factors offer fertile ground for research in preservice teacher education.

The expansion of field experiences in a cohort context did not help students change their conceptions of theory or science education. The cohort students developed their ideas based on their opinions, their cohort colleagues' opinions, and experiences in the schools. The students in the RP class allied themselves, initially, with what they heard and read in the methods class. As the semester progressed, the RP students started to change in the direction of the cohort students. They became more practical and "real-world" focused. In this sense, the cohort experience may represent an acceleration along a time-line of professional learning. It may not, as structured in this program, alter teacher preparation in more fundamental ways. In order to make more profound changes, the field and cohort experiences would have to be more carefully constructed both in this course and prior to it. Lortie (1975) recognized this dilemma when he pointed out that students have 13 years of experience in the schools. Adding more experience, by itself, might not have anything but a conservative effect.

Dewey reminded us long ago that it is "not enough to insist upon the necessity of experience, nor even of activity in experience. Everything depends upon the *quality* of the experience which is had" (1997, p. 27). A change in the structure of the preservice program, as in expanded field experiences or a cohort, does not guarantee progress. Unless groups and field experiences are structured

for a purpose, it is possible that they will interfere with program goals rather than work to achieve them.

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PRESERVICE TEACHER COHORTS AND THEIR IMPLICATIONS FOR MATHEMATICS AND SCIENCE EDUCATION

A monograph accepted by the National Institute for Science Education

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Many schools of education are exploring the use of preservice teacher cohorts (e.g., AACTE, 1991). Cohorts offer promise as a means to prepare students to take an active role in school communities by providing teacher education students a stronger voice in controlling their experiences and in the development of their professional norms (Holmes Group, 1986; Goodlad, 1991). Because of the intense relationships developed over time, cohorts may provide the opportunity for preservice students, teachers, and faculty to engage in more reflective conversations bridging theory and practice (Winitzky, Stoddart, & O'Keefe, 1992; McBee, 1998; Stoddart, 1993).

Cohorts can serve to address issues in preservice preparation of mathematics and science teachers. Preservice teachers often have a naive or constricted view of the nature of science and mathematics (Raizen & Michelson, 1994). Their preparation in content is often lacking (Shamos, 1995; Rutherford & Ahlgren, 1990). Preservice cohorts can provide mutual support for understanding of science and mathematics content and pedagogy. Cohorts also

extend the opportunity for preservice teachers to negotiate their own professional norms as teachers of mathematics and science.

Background

Definition and components of preservice cohorts

The term "cohort" has several definitions. In its traditional context it often denotes an age group. "Cohort" in preservice teacher education describes a group that undergoes a course of study at the same time, creates a shared purpose, and engages in other activities intended to bind them together a group (Huey, 1996; Basom, Yerkes, Norris, & Barnett, 1995). There are several types of cohorts possible under this umbrella. A closed cohort is one in which all coursework is taken in a prescribed order at the same time. No new members are admitted to the group after its initial formation. In an open cohort, students take their core courses together but may have other courses that they take independently. No new members are admitted. In a fluid cohort, students may leave or join at different points (Yerkes et al., 1995; Huey, 1996).

Cohort students receive support from each other as they both study and apply pedagogy (Goodlad, 1991; Barone, et al., 1996). This requires that experiences be structured to enable and expect mutual support (Basom, et al., 1994). This would then exclude small preservice teacher programs unless there are some direction and shared social or professional experiences. For example, a small liberal arts school may have a small group of students progressing together through a program. But a cohort is more than a small group. A cohort is a

group which is constructed to work together as a group, share coursework, and goals. Unless a small college program groups students to create a shared goal and experience, it is not a cohort in the sense intended here.

Many preservice cohort goals, outcomes, and techniques appear to be shared with cooperative learning theory. Johnson and Johnson (1991) defined the processes and characteristics of effective cooperative groups. Group processes include interdependence, interpersonal learning, cohesiveness, and the sharing of common goals. Effective groups, using these processes, can accomplish their goals, maintain internal relations, adapt, and improve. These goals and processes are similar to those stated for preservice cohorts (Bullough, et al., 1997; AACTE, 1991; Barone et al., 1996). Several authors suggest that attention should be paid to creating cohorts that can work and learn together through the development of a shared goal (Huey, 1996; Yerkes, et al., 1990). Preservice cohorts can structure group goals and interactions that advance individual learning or the capacity to work effectively in a group (Huey, 1996). Despite the similarities between cooperative groups and preservice cohorts in both purpose and structure, program descriptions have made few direct references to the substantial literature in cooperative learning.

The size of the cohort varies both between and within programs. Davis (1993) offered the flexible suggestion that group size be small enough for each member to interact with each other, while "large enough to accomplish its task. Size depends on purpose" (p. 244). Goodlad (1991) recommended that a cohort of ten to fifteen students be assigned to an individual school. This required a

logistical limit to cohort size because of a limit on placements and space. Barone, et al. (1996) suggested that cohorts should not exceed 25 students in the belief that smaller class sizes will promote greater interaction and more support. In general, preservice cohorts seem to average about 20 - 25 students (e.g., Barone et al, 1996; Huey, 1996; Cabello and Eckmier, 1995).

The duration of the preservice cohort depends on the structure of the program. Barone et al (1996), Cabello and Eckmier (1995), and Goodlad (1991) recommend that cohorts start with the first education courses and end with the cohort graduation. The length of the programs, however, differs substantially. In some fifth year programs, the cohort is together for one or two semesters. In other programs, such as the experimental program in the California State University system (Cabello & Eckmier, 1995), the cohort is together for five years.

While some preservice cohorts have a subject focus, others do not. Most descriptions of preservice cohorts do not mention a content specialization (see, for example, Cabello & Eckmier, 1995; Sandoval, 1992). It is assumed that cohorts in those programs are not content-specific. Since the purpose of this paper is to address the potential of cohorts in mathematics and science education, all of the sites visited were chosen because of their content focus in mathematics and/or science.

History of preservice cohorts

The concept of cohorts caught on quickly in preservice education. In a late 1980s study of a group of diverse preservice teacher education programs, Goodlad, Soder, and Sirotnik (1990) found nothing that resembled a cohort

system. He found "buddy systems" in which students were paired with other students for support, but not cohorts.

The landscape has changed dramatically in the last nine years and many schools of education offer cohorts as either a regular part of their preservice education program or as an alternative to their traditional programs (for reasons described below). There are now over 200 professional development school programs in the country (Abdal-Haqq, 1991), many of which employ preservice cohorts. Further evidence of a growing trend towards preservice cohorts comes from the sixth Research About Teacher Education (RATE VI) from the American Association of Colleges for Teacher Education (AACTE, 1992). This data base resulted from surveys of 47 institutions of preservice teacher education. One survey item inquired about each program's progress in the utilization of student cohorts. Almost two thirds of the faculty and staff surveyed reported moderate to excellent progress in the development of preservice cohorts.

Rationale for preservice cohorts

Cohorts have been promoted as a structure to remedy several problems in preservice education. They can provide experiences for preservice teachers that would help develop a sense of professionalism in learning to identify problems and create solutions in a collaborative environment. Cohorts could provide a supportive learning environment in which a synthesis between theory and practice is attempted. Students in a cohort could support and share with each other as they apply both their knowledge of pedagogy and subject matter in the classroom (Kasten, 1992). Research on the effects of cohorts is therefore necessary

to understand to what extent cohorts promote greater understanding of content, pedagogy, and working in a school community. As these programs become more popular in preservice teacher preparation programs, a careful examination is needed of how, and if, cohorts work and to what effect.

The *Standards for Professional Development Schools* from the National Council for Accreditation of Teacher Education (NCATE, 1998) did not require professional development schools to employ cohorts. They did, however, recommend "clustering" of resources and suggested student cohorts as an example (Indicator 10 of the "Organization, Roles and Structures" Critical Attribute). Other indicators in the standards, such as the development of learning communities, did not specify student cohorts but cohort structures were again mentioned as a structure to satisfy the standards. Goodlad (1991) recommended preservice teacher cohort groups in which students take their courses and experience their field practica together. Goodlad's Postulate Nine stated, "Programs for the education of educators must be characterized by a socialization process through which candidates transcend their self-oriented student preoccupations and become more other-oriented in identifying with a culture of teaching" (1990, p. 288). He recommended that the cohort group be placed at a school, not with specific teachers. This would encourage students to see themselves as part of a school community rather than as an apprentice in an individual teacher's classroom.

Many of the general problems of preservice teacher education become amplified in preservice preparation in mathematics and science. Preservice

teachers, especially in elementary teacher education, often lack the confidence, skills, and content background necessary to provide a foundation for quality mathematics and science teaching (Cardena & Roden, 1998; Heikkenin, McDevitt, & Stone, 1992)). A preservice teacher may only take one methods class in mathematics and science. The methods courses are often not connected to field experiences or to content courses in mathematics or science. When coupled with a poor content background, the lack of a coherent program leaves students inadequately prepared to teach mathematics and science.

A major issue in the preservice preparation of teachers in mathematics and science is the gap which often exists between how students are taught science at the university and how Colleges of Education present science teaching through their methods courses (Lyons, Stroble, & Fischetti, 1997) Preservice students see science and mathematics teaching modeled through university content classes that may lead to the impression that these fields are characterized by the rote memorization of isolated facts (Beiswenger, Stepans, & McClurg, 1998). If preservice cohorts experienced content courses together, they could jointly traverse this gap between science and mathematics methods courses and content courses.

The use of cohorts in preservice teacher programs presents an opportunity for students to learn science, mathematics and pedagogy in a supportive, social context (Raizen & Michelsohn, 1994). This could serve to improve preservice teacher attitudes toward science and mathematics and preparation in these areas. As preservice teachers participate in courses and learn science or mathematics

together, they can begin to come to a mutual understanding that science and mathematics is a socially constructed enterprise that serves to organize our experiences. As Loucks-Horsley et al. (1997) suggested, "...professional learning takes place in a community of learning; just as students deepen their knowledge of science and mathematics through communication, so too do their teachers learn through formulating, sharing, and challenging what they and their colleagues think they know in order to learn" (1997, p. 14). This is a powerful idea. The way in which science and mathematics are learned is connected to the way knowledge is generated in these fields (Kennedy, 1998). Cohorts could contribute to a more sophisticated understanding of the fields by leading preservice teachers to develop their own community of mathematics and science learners.

Purpose and Methods of the Study

Cohort membership in preservice experiences provides the opportunity for students to develop their own norms in an educational community (Goodlad, 1991; Barone et al., 1996). Through this process students can develop new attitudes and understandings of mathematics and science. Despite the careful logic behind these claims, there is a need to attend carefully to the effects of preservice cohorts. The following research questions capture some major issues in preservice teacher education and the potential of cohorts to contribute to improved preparation of teachers in mathematics and science.

The purpose of this study is to address the following questions:

1. What influence do cohorts have in the development of professional identity and attitudes about teaching?
2. What impact do cohorts have on the construction of knowledge of, and attitudes toward, mathematics and science?
3. How does membership in a cohort affect student understanding of pedagogy?
4. Do cohorts affect student retention at the university? In the first years of teaching?
5. Does the cohort improve or intensify the nature of the relationships between the university faculty, school faculty and the students?

Methods

The research questions were generated from references to literature in preservice teacher education and science and mathematics education. These included references from a variety of sources: the ERIC database, evaluation documents or conference reports from existing cohort studies (largely from educational administration), journals in science and mathematics education, as well as journals in teacher education; and books and handbooks on preservice teacher education. Sources that proved to be particularly helpful were Abdal-Haqq's (1993) annotated bibliography for professional development schools and the Millstein review of Danforth programs in educational administration (Milstein & Asssociates, 1993).

In addition to the literature base, I visited three preservice preparation programs. Each site, described in detail later, represented a different approach to the incorporation of cohorts in mathematics and science education. I analyzed documents from each program for information about cohort features. Cohort members, university faculty, and teachers were interviewed about the cohort

structure, purpose, and effects. The participants were asked variations of the research questions as well as follow-up and clarifying questions. I had access to several university administrators who provided information about program goals and structures.

Interviews and notes were typed. After typing, I read the notes and placed them into categories defined by the research questions. The responses were analyzed for patterns and evidence about preservice cohorts and the relationships to mathematics and science education. I compared comments from different sites and attempted to find both similarities and differences in responses. I then compared and interpreted these differences in light of their programmatic structure.

Several factors limited the analysis this paper. First, there was a paucity of research material on preservice cohorts. There were very few descriptions of preservice cohorts and research was even more rare. Second, my time at two sites was limited. I was most interested in the structure of mathematics and science cohorts and could not get, in my limited time, more than a superficial overview of the programs. For these reasons, this report should not be read as an exhaustive evaluation of the three programs. Pseudonyms have been used for the names of the three institutions.

Evidence from the Literature: Educational Administration

I struck an unexpected roadblock as I researched this paper: teacher education literature includes few descriptions of preservice cohort programs. I

include a review of the cohort literature in educational administration for the following reasons:

- There is a more substantial volume of descriptions of cohort programs in educational administration.
- Because the rationale for the use of preservice cohorts in educational administration paralleled some of the issues in preservice teacher education.
- The reports about preservice administrator education also take place in an environment bridging the schools and universities.

For these reasons, literature from educational administration can serve as a starting point for a discussion of preservice teacher cohorts.

Educational administration was the target of a great deal of criticism in the 1980's. The Carnegie Forum on Education and the Economy (1986) and the National Commission for Excellence in Educational Administration (1987) produced reports critical of existing programs. Several reports lamented the lack of rigor in preparation and the inattention to matters of curriculum and field experiences. Principals were self-selected, lacked necessary skills, took required classes that were theory-based rather than practice-based, and spent little time in the field or reflecting about their field experiences. In a 1988 survey of practicing educational administrators, only 10% valued their university experience while 61% felt that their field experiences were most helpful in their preparation (Milstein & Associates, 1993). In an era when schools were being called on to "transform," principals were not being prepared to facilitate this transformation.

The Danforth Foundation responded to the criticisms of educational administration by creating the Danforth Program for the Preparation of School Principals (DPPSP) in 1986. In 1987, they funded their first four programs of

principal preparation. By 1992, there were 22 universities participating in the Danforth initiative. The Danforth agenda included:

- improving communication between the universities and schools,
- emphasizing recruitment of candidates rather than self-selection,
- improving the recruitment and retention of women and minorities in principal preparation,
- increasing hours of field experiences,
- increasing attention of instructors to needs and characteristics of adult learners,
- enlarging the scope and duration of their preparation beyond school and university, and
- studying and revamping of university coursework.

In response to these needs, DPPSP proposed a program that led to the development of student cohorts, increased university-school collaboration, more field experiences, the careful selection and training of school-based mentors, and a field-based delivery model. The cohorts were intended to provide a supportive learning environment, encourage program coherence, provide networking opportunities and a sense of group purpose (Yerkes, et al, 1995; Milstein, 1993).

While the programs participating in the Danforth project implemented many similar features, they also differed in several respects. In a description of cohort models in Danforth programs, Yerkes, et al. (1995) found a variety of programmatic features. While most programs had closed cohorts, some employed open cohorts. A few schools even allowed fluid cohort membership. The number of students in a cohort also differed. Some had as few as five students per cohort. Others had thirty. Some had a single faculty member who chaperoned the cohort during its program of study, others had a cohort "team" of professors.

Several reviews have suggested that there are a variety of benefits resulting from the incorporation of preservice cohorts in educational administration. Many reports from cohort-based programs described a context in which students felt supported (Mulkeen & Cooper, 1992; Yerkes, et al, 1995; Weise, 1992). Several authors suggested that the effects of the program extended beyond the university coursework -- the networks developed seemed to be maintained as the students began their new careers (Milstein, 1992; Yerkes et al, 1995; Weise, 1992). In a comprehensive description of five Danforth programs, Milstein suggested that, "Students in cohorts seem to be more motivated and of higher quality than those in earlier preparation programs" (1993, p. 34). This improvement was due to several factors. First, admissions requirements were toughened as part of the Danforth program. If students enter better prepared, one would hope that they would raise expectations. Second, many structures were put in place that facilitate adult learning. Adults learn best when they can direct their own learning, influence decisions, emphasize relevant problems of practice, tap into their own experience and build strong relationships with peers (Yerkes et al., 1995). Yerkes et al. suggested that cohorts, through emphasizing social interaction and bonds, can help take advantage of these factors that promote adult learning. In an evaluation of the Danforth program at the University of Houston, Weise found it "logical to infer...that the basic principles of adult learning had a definite impact on active student engagement in the differentiated learning experiences" (1992, p. 182).

In addition to the affective features of cohorts, cohorts also helped to provide programmatic coherence. Since students were admitted as a group, the use of cohorts allowed a more cyclic recruitment of students and more attention to course scheduling and field experiences. The evolution of the university preparation program also provided participants with a model of how schools might be transformed (Milstein & Associates, 1993). Cohorts served to provide a clarity of purpose and, when combined with active faculty involvement, an improved delivery model for team-building and reflection. These ingredients would be just as important for school improvement as they are for the university.

Faculty reactions to cohorts in educational administration have been mixed. Many felt that cohorts forced the faculty to work together more and take greater risks. But there are down-sides as well. It required more faculty time and this was time which the university did not generally acknowledge in faculty reward systems. Some faculty also saw a danger in a heightened sense of elitism on the part of the cohort. They feared that in an era of more collaboration and greater sense of community, elitism may hinder, rather than promote reform. Elitism implies a sense of superiority which may not promote attitudes of cooperation and collaboration (Darsesh, 1988).

The reports available on cohort programs in educational administration tend to be descriptive and anecdotal. As Valli et al. (1997) pointed out in another context (that of professional development schools), organizational changes and changes in teaching are easier to document than effects in schools or in student

learning. What is available, however, suggests that a positive relationship exists between the use of cohorts and students' sense of belonging, development of networks, sense of confidence, and reflection on practice (Yerkes, et al, 1995, Yerkes, et al, 1992; Mulkeen & Cooper, 1992; Norris & Barnet, 1994).

The support for cohorts in professional schools of educational administration remains strong. Despite many reports of the benefits of cohorts, however, there has been little or no attention to whether cohorts affect the quality of educational administrators. While students reported that they liked the experiences provided by cohorts (Kraus, 1996; Norris & Barnet, 1994), there is no evidence that the graduates are practicing in ways different from graduates of traditional programs. There were no definitions provided for an educational leader, and few, if any, clues as to whether a cohort structure is more likely to produce administrators who are better prepared.

Cohorts in the Danforth Foundation, as in preservice teacher education, were one part of a range of programmatic changes. It is difficult at this point to attribute the improved quality of students to cohort membership -- especially when admissions requirements changed as well. Courses and student evaluations were often changed and preservice administration students had a more developed relationship with the university faculty. These factors could all contribute to improved preservice satisfaction with the program. As Weise (1992) suggested, research is needed that dissects what different components add to program effectiveness.

Evidence from the Literature: Preservice Teachers

Professional identity and attitudes

Cohorts, according to the Holmes Group (1986), provide an opportunity to develop collegial and professional norms, "A sense of community among the students pursuing careers in teaching is accorded through reasonably sized cohorts that enter and pursue coordinated programs of study" (1986, p. 89). Huey (1996) stated that, "The cohort can bring structure to the field experiences by structuring activities and interaction to help students interpret and integrate activities through guided reflection to arrive at a meaningful understanding of teaching" (1996, p. 20). According to Huey, students in cohorts can be empowered by letting them choose their cooperating teachers, having input on field assignments, and by making their own logistical arrangements. While these same opportunities could be made for preservice students in non-cohort programs, they take on a different dimension with cohorts. Cohort students, since they take the same classes and participate in the same field experiences, have a significant level of familiarity and background knowledge about each other and the teachers. This allows them to make more informed judgments. In university courses, students who have shared much or all coursework have a greater shared knowledge from which to draw in choosing assignments or working on projects. This all serves to facilitate the development of their own sense of community and professional attitudes.

The professional attitudes of preservice teachers are formed through experiences in the schools and university (Staton & Hunt, 1992). Chickering

(1993) presents a model in which the institutional environment, among other things, profoundly affects student learning, cognition, and attitudes. Students in preservice cohorts, especially since they are often part of a university-school collaboration, have two institutions from which to learn and form attitudes. Relationships between the students in the cohort can serve to mediate the experiences in the schools and universities through the fostering of new professional norms.

Since cohorts facilitate student membership in their own group as well as with the schools, cohorts may reduce the sense of professional isolation often experienced in teacher education. Sustained relationships between students in a cohort could expose them to a variety of approaches to teaching and learning. This is lacking in non-cohort programs. In a survey of faculty and students in 29 education programs, Su (1992) found that peers have very little effect on the socialization of preservice teachers. Many of the factors which inhibited peer relationships (taking different courses, lack of social interaction, discontinuity of classes and student teaching) could be significantly altered by membership in a cohort. The isolation, both professional and social, which starts in preservice programs could be significantly reduced. Students in cohorts also become more familiar with teachers in the schools. This again serves to reduce isolation. Students can feel a part of their own cohort as well as form a part of a larger community composed of the schools and university.

Knowledge and attitudes of mathematics and science

To teach to the new standards in both mathematics and science, teachers must have a solid preparation that allows them to understand the nature and content of the intellectual fields as well as the connections between content areas (NRC, 1996). Preservice teacher education programs have been subject to the criticism that preservice students, especially those in elementary education, lack a rigorous preparation in subject matter (Holmes, 1986). This weakness in content understanding is especially pronounced in mathematics and science (Raizen & Michelsohn, 1994; Coble & Koballa, 1996).

Cohorts represent potential for students to support each other in their study of mathematics and science content. If cohorts take content courses together and have structures in place to support small group learning, then it may be possible to improve student understanding of science and mathematics content. This potential for improved content understanding through small group work has support from a meta-analysis of small group learning in science, mathematics, and technology. Springer, Stanne, and Donovan (1997) found that achievement in mathematics and science is improved significantly through small group learning. The application of their research finding to the context of cohorts is complicated, however, by the fact that the authors found no significant difference between small groups that worked together for short, medium or lengthy periods (p. 16).

Descriptions of preservice teacher cohorts in the literature do not include enough detail to determine if the program goals included the improvement of

mathematics and science (or any content area) learning. It is possible that the promise of cohorts to improve individual academic preparation remain unrealized because there are few systematic efforts to take advantage of cohort structure for learning mathematics or science content. Most of the emphasis focuses on issues of collaboration and emotional support or attitudes.

Individual learning can be strengthened through small group membership and the structuring of group goals (NRC, 1994; Johnson & Johnson 1997). Improved academic achievement is unlikely, however, without explicit goals to support it (Johnson & Johnson, 1975; Huey, 1996; Koeppen, Huey, & Connor, in press). There is little evidence about preservice student achievement in programs that employ preservice cohorts (e.g., Ross, 1995). Members of a group may feel confined to stay within the norms of a group and not excel. For example, Huey found that cohort members were not better prepared academically nor more likely than traditional students to seek academic recognition. Students may have a heightened sense of confidence but their academic preparation is comparable to students in non- cohort programs.

Pedagogy in mathematics and science

Many authors have reported a tension between preservice students' understanding of new standards of practice and the expectations and examples set by their cooperating teachers (see, for example, Fuller, 1997; Frykholm, 1995). If preservice students are expected to change in their understanding and application of new standards of teaching, then they must be supported to do so even when their field experiences are not consistent with these standards. A

cohort may provide one way to establish and maintain these new norms of teaching.

As students in cohorts start to develop their set of professional norms and attitudes, it is critical that the process be facilitated by university faculty. Graber (1996) described a cohort-structured program that had a clear, reform-minded agenda, yet students were assigned to a school with a traditional program. To avoid the clear tendency of students to identify with their mentor teachers, the university faculty consciously and thoroughly addressed the discrepancies and helped the cohort understand practice as well as ways practice could be changed. The cohort established and maintained these new expectations and supported each other with a reform-minded approach. Graber attributed much of the program's success to the cohort. Cohorts facilitated the development of friendships and overcame the resistance to new ideas about teaching by some members of the cohort. Graber found that "The influence of a cohort cannot be underestimated, particularly because it facilitates an environment in which students begin to feel a part of a strong professional culture" (1996, p. 457). Graber also cautioned that if careful attention is not paid to the cohort experience, that it can have very negative implications. For example, the program emphasized a fitness-based rather than a sports-based curriculum which is contrary to traditional programs. If their experiences both before coming into the program and during field placements had not been carefully debriefed and analyzed, the cohort could have reinforced traditional beliefs rather than supported students

in rethinking their assumptions. Group cohesion may not be enough in itself, the cohesion has to be shaped around improving practice.

Retention

Retention of qualified teachers is a serious issue in some localities. Some states, such as California and Texas, are experiencing an acute shortage of teachers, especially in urban areas. These areas cannot afford the large attrition rate of beginning teachers. The attrition rate approaches half of all teachers within the first five years of teaching and it is especially disturbing that the academically talented and those with a content specialization are more likely to leave teaching (Darling-Hammond & Sclan, 1996). Given the financial investment in educating teachers and the intense need for a teaching force that is academically prepared, it is important to consider the possible effects of cohorts on retention. There are two issues of retention. One is the retention of students within a program. The second is the retention of teachers after they enter teaching.

Tinto (1993) has shown that student retention is enhanced by participation in small learning communities. Cohorts represent such a group. Cabello and Eckmier (1995) reported that the support of a cohort was instrumental in the retention of some students in a five year program in California. In interviews and surveys, over ninety percent of a cohort listed the support network of the cohort as the program's greatest strength. They stated that, "The graduates contend that this support network [of cohort students and faculty] helped them from burning out at school and in their first two years of teaching" (p. 41). The

program graduated 68% of its original members, a rate that is artificially low because several of those who left were employed with an emergency credential by local districts. Of those who graduated, all but one reported that they were successful in their teaching careers after three years of teaching.

Cohorts, through the building of personal and professional relationships, may support students and teachers who may otherwise quit. Preliminary data from Iowa State University indicates that this may be true. In a survey of cohort students, Huey (1996) found that students appreciated the support they received from each other and they were more likely to plan to stay in teaching than those from non-cohort programs. Coupled with the evidence (Cabello & Eckmier, 1995) from California, cohorts may be a significant tool to promote teacher retention.

It is important to study the effects of cohorts on retention in more detail. Are bright and capable students completing the program who would otherwise dropout? Alternatively, do weaker students finish when they would otherwise dropout? Research needs to clarify what types of students benefit from this support and whether retention of all entering students is an appropriate goal.

University-School relationship

There is often a wide gulf between teachers and university faculty. Teachers often feel that university professors are too research-focused and out of touch with "real life." A cohort structure could model situations in which there is a sharing of, and value for, knowledge generated in schools and in universities. For example, many programs with cohorts have field-based

seminars in which teachers, university faculty and preservice students participate in dialogues about teaching and learning. In this way the collaboration could serve to build a learning community which values continuous learning in the school culture.

Field experiences are an important link between the university and the school. Field experiences can be organized in a variety of ways. Students from a single cohort may be placed in different schools and these schools may, or may not, have a formal link to the university. Students may have an intense, long-term relationship with a school or may be transient visitors. The relationship of the university to the school sites are also variable. There may be a close relationship with seminars, professional development, and/or joint research projects. This describes what Goodlad (1991) has termed "simultaneous renewal." At the other extreme, the relationship between university and school faculties may not extend beyond a mutual interest in a preservice student.

Site Visits to Preservice Preparation Programs

I visited three universities with preservice teacher cohorts that emphasize mathematics and/or science. The sites were selected after consulting a variety of resources. Literature in preservice teacher education, and science and mathematics education was a primary source of information. I was also able to consult with Roger Soder of the National Network for Educational Renewal (NNER). Since most of the preservice programs in the NNER include cohorts, he was a valuable source of information. I chose to visit one of the programs he

recommended because it included a consortium of schools within the state that employed cohorts. These schools included a Research I institution, an urban program for post-graduate students, and a rural program in a university with a history as a normal school. Unfortunately, because of an uncooperative blizzard, I was only able to visit the urban site. A second site was selected because several research and review articles exist that describe the structure and outcomes for their mathematics education cohort. In conversations with faculty from this site, it was apparent that they had considered some of the issues raised in my research questions. A doctoral dissertation evaluating the effects of their environmental science cohort was also available.

I was involved with both the university and school settings of the last site. I was a teacher at the elementary school and a science methods instructor at the university. While this provided a degree of convenience, the site was also important because it was unique in several respects. It had a traditional preparation program as well as an alternative, cohort-based program. The cohorts were non-content specific with the exception of one that was mathematics-based. This provided a rich potential to compare cohort to non-cohort and a content-based cohort with non-content specific cohorts.

At Western University, the entering students are placed in theme-based cohorts. One of the themes is mathematics and science education. I spent most of my time with this cohort but also visited an elementary school with a language arts focused cohort. The program enrolls between 100-200 students.

Table 1. Summary of Preservice Program Features

	Size of cohort/ Post-grad. or undergrad.	Duration of Cohort	Subject-matter focus in study	Faculty involvement	Methods courses	Content courses
Western University	20-30/ Post-Grad.	1 to 1 1/2 years	science and mathematics combined	faculty member assigned to cohort, in school each week	Integrated, over two semesters	taken before admission
Southeastern State University	17-35/ Undergrad.	2 years	Evironmental science, another on mathematics	faculty member assigned to cohort, in school each week	Separate, over several semesters	taken before and after admission but not as a cohort
Midwestern University	20 - 30/ Undergrad.	3 years	mathematics cohort and general cohorts	varies -- math cohort had different coordinator each semester, occassional participation at school	Separate, in one "mega-methods" with integrating seminar	taken before and after admission but not as a cohort

The cohorts have about 20-30 students each. This program is post-baccalaureate with students taking two semesters of coursework before student teaching. Each cohort is assigned to a local elementary school. A faculty or staff member spends one day a week at the school and there is an on-site teacher who is released from classroom duties to supervise the students and work with teachers.

At Midwestern State University, the cohort program is a small, experimental element within a much larger undergraduate teacher preparation program. The elementary education majors at Midwestern State University number between 900-1,000. Each year a cohort of about thirty students is admitted to the experimental program, Learning in Context. Although secondary students are encouraged to apply, the cohorts are composed largely of elementary education students. The cohorts stay together for three years. One cohort emphasizes mathematics. For field experiences, this cohort is housed at an elementary mathematics and science magnet school. No other cohort in Project Opportunity has a specific content focus. Each cohort is assigned to a set of schools which include elementary, middle and secondary locations. The cohorts have a university-based site coordinator but no site-based supervisors. Other aspects of the program differ from the regular program. Cohort students take more education classes, have a coordinated methods block with an element called "team-time," and take courses taught by clinical faculty as well as regular faculty.

Southeastern State University has an undergraduate program which is totally cohort-based. They enroll about 300 students. The cohorts vary from 17 to

about 30 students. Each cohort, except for the middle school and secondary programs, has a theme. These themes run from a Padeia school concept, to environmental science, language arts, and children's thinking. Each cohort is based at one or two schools. A faculty member is assigned to a cohort based on his/her content interests. The faculty member, and either a site-based supervisor or graduate student, stay with the cohort for the two year program. The mathematics-focused cohort, which emphasizes understanding of children's thinking, is housed at a school with teachers who are trained in Cognitively Guided Instruction (CGI). CGI is a mathematics-centered program focused on the development of mathematical meaning in young children (Vacc & Bright, 1999).

These three university programs were chosen because of the variety they represent in the structure of, and approach to, cohort-based teacher preparation in mathematics and science (See Figure 1). These programs will be discussed in greater detail in the following sections.

Professional attitudes and identity

Sweeping his arms around a classroom filled with his colleagues, a preservice teacher stated, "I don't think I could have made it without them." His sentiments were shared by all of the preservice students with whom I spoke. From the site visit data, students at each of the three universities valued the sense of community developed in the cohorts. At one site, students complained about the cliques that developed but still gave credit to their own clique for helping them through the program. Most students interviewed expressed support of, and by, other members of the cohort. When I asked what kind of

support students felt they received, answers were somewhat generic. "Help with projects," "understand assignments." Two students suggested that they enjoyed complaining together.

Faculty at two of the schools suggested that cohorts developed their own sense of professional norms. Terms like "cohort effect" and "cohortness" were used to describe cohort behaviors. One instructor noted, "Your end of term evaluations will look like they came from a single person." These effects have both positive and negative consequences. They are positive when students support each other in learning and developing professional identities. They can be less than positive when they become clique-ish and develop strong internal pressures to conform. At one site, I attended a student meeting at which the preservice students were critical of faculty and communication issues. Later I asked a student about his views of the meeting and he contradicted the conclusions reached. When I asked him why he said nothing, his response was that he was "tired" of being the only one willing to raise an alternative voice. Another faculty member was pleased with her current cohort but said her last cohort was enervating, "They were followers. If one was sour, they all puckered up." This is a difficult tension. On the one hand, faculty desire a strong cohort to develop a sense of professional identity. On the other hand, the professional identity still has to be shaped and nurtured. Otherwise, as Johnson and Johnson (1991) and the NRC (1994) suggest, there is the possibility that small groups (and by extension in this case, cohorts) can become a negative force.

A sense of separateness, even elitism, can develop on the part of cohort students. Midwestern State University faculty reported this elitism to be a double-edged sword. On one side, the elitism helped students develop a sense of empowerment. They were more comfortable in classrooms in both the schools and the university. On the other side, faculty reported situations in which cohort students developed an arrogance and demanded special treatment or consideration. In one case, students were unhappy with an instructor, demanded a meeting with the department chair and proceeded to explain that since they were a cohort, they were supposed to get only the best. Since their instructor was not the best, they suggested a replacement. Another cohort produced a brochure describing the program as "elite" but faculty members convinced the students to re-write it using less inflated language. Since all Southeastern and Western preservice students are in cohorts, this sense of elitism does not develop.

Cohort groups, if they are to be effective in heightening a sense of professionalism, must be guided to develop a sense of group purpose and goals. Faculty serve to facilitate this. At both Southeastern and Western, a university professor or staff member is assigned to a school and is present at the school one day per week. The time is credited in the professors' teaching load but at neither site did the faculty believe that the time required by the program was recognized enough by the faculty reward structure. At Midwestern State University, each cohort has a faculty or staff supervisor but the coordinator may change in different semesters. Cohorts at Midwestern State University have a much more

intense relationship to faculty members, especially during their methods semester, than is afforded non-cohort students.

Cohorts can provide, in the words of Lortie (1975), a sense of a "shared ordeal." Lortie suggests that a shared ordeal, such as boot camp or the first year of study in medical or law school, leads to a common bond and a "collegial feeling found in established professions" (p.74). Learning in Context at Midwestern State, each cohort shares the experience of "megamethods." Megamethods is the preservice version of boot camp. Students take four methods courses and are in a classroom full-time for six weeks. As an academic advisor put it, "We own them [the preservice students] for that semester." The students are in the classroom so long that teachers said they forgot the preservice students were not student teaching yet. This experience provides the students with a strong bond and a sense of having survived an ordeal together. At Southeastern, I attended a session of a weekly cohort seminar and the cohort members clearly bonded over the PRAXIS test that many were taking the next day. There was considerable anxiety in the room as those who had taken the PRAXIS gave hints about what to study. If students were not in cohorts, they would miss this shared experience that other members could offer during these events.

Levels of student social interaction within cohorts vary between programs. In Learning in Context at Midwestern State University, there are planned, informal structures for social interaction as well as formal experiences in classes or schools. There is an annual overnight trip to an environmental education center, travel to professional meetings and monthly meetings which are partly

social and business. At the Western University, the interactions centered around coursework. There were occasional class-meetings off campus but most of the interactions were course-related. At Southeastern State University, there were occasional, optional meetings of cohort members. For example, several members of the environmental science cohort participated in an overnight stay at a local science museum. While these "extracurricular" events were welcomed by some students, at one site they were also considered somewhat of a nuisance to people with busy schedules.

Knowledge and attitudes about mathematics and science

All three programs had a cohort that emphasized mathematics and/or science. There are two ways for students to be supported in the learning of mathematics or science content. One is for students to take content courses together and help each other learn: e.g., they could study together or tutor each other. Another way is that students, especially if they take concurrent methods courses, may be contextualize mathematics and science content through its importance in their professional development. If students think about teaching a subject as they learn it, they may be more motivated to understand it.

None of the three sites configured the content courses so that the students can help each other or take advantage of the reinforcement through methods courses. Western University is a graduate program in which students had already taken the required mathematics and science classes. Since students do not take content courses together, there is little opportunity for them to support each other in learning mathematics or science content. The teacher preparation

program expects students to be well versed in the "central concepts, tools of inquiry, and structures of the disciplines they teach" (School Residency Handbook, Western University Initial Teacher Education Program, 1997). The methods courses are integrated (mathematics, social studies, science and reading) so there is no concentrated block of time available for students to study mathematics or science pedagogy. Students who choose mathematics and science as their areas of emphasis engage in a seminar which meets occasionally through the semester. These sessions are geared to support student understanding of issues of pedagogy in mathematics and science, but not to learning mathematics and science.

Both Southeastern and Midwestern have undergraduate programs but they have open cohort systems: students only take education courses together, not content classes in other areas. This continues the traditional division between what is taught and how it is taught. Southeastern State University cohorts often have the methods course associated with its area of emphasis during their first semester. This helps to cement their identity as a science cohort and could help students see connections to science in their other curriculum classes. At Midwestern State University, the integrated methods courses occur after the midpoint of a cohort cycle. Since they take place so late in the program, it is unlikely that students get much support in learning science or mathematics content or in placing it into the context of methods. At none of the three universities were there small group structures in place to help students understand content. Given the lack of attention to this dimension of learning, it

is highly unlikely that preservice cohorts facilitate the understanding of content at these three sites.

This suspicion was confirmed by faculty members. At each site at least one faculty member was asked if they thought that students benefited academically from cohort membership. In every case the answer was "no." In fact, at Midwestern, several faculty members even thought the opposite. They felt that cohort pressures tended to suppress achievement levels. As discussed above, students who were very capable may feel the social pressure of a cohort to conform to the average. I asked one student in science methods class why he never contributed to discussions and he said he was tired of the "eye rolling" response of his fellow students. This "regression toward the mean" may appear inconsistent with the cohort sense of elitism. While students as a group may feel "elite" when compared to other groups, members within a cohort may be discouraged from appearing more elite than others. None of these programs had a mechanism in place to support individual achievement.

Attitudes toward subject matter have been shown to improve in a content-themed cohort. In a study of the preservice elementary cohort that emphasizes environmental science at Southeastern State University, Hildreth (1997) found that after two years in the program, preservice teachers expressed a greater sense of efficacy in teaching science than a comparison cohort which was not science-focused. Hildreth also found that preservice teachers in the environmental science cohort significantly improved in some measures of attitudes toward science and knowledge of process skills. Since both groups in

Hildreth's study are cohort groups, these results do not suggest an advantage of a cohort but rather an advantage to extra attention paid to science within a cohort. More research is needed to isolate the variables involved to see what effects cohort membership has versus the effects of extra instruction and experience in science. In their meta-analysis of small group learning, Springer et al. (1997) also reported a tendency for attitudes toward mathematics and science to improve the longer that small groups worked together.

It is unlikely, given the present organization of preservice cohorts, that content understanding in mathematics and science will improve as a consequence of cohort membership. The programs, both the ones visited and those described in the literature, are not designed to support small group learning of content or to pay attention to content in general. Hildreth, however, provides evidence that attitudes toward science could be improved through a content-themed cohort. Faculty at Midwestern State University are in the process of collecting and analyzing data on attitudes toward mathematics in a mathematics-themed cohort. Attitude surveys and focus groups have been administered to the mathematics cohort periodically. Preliminary evidence suggests that students in the mathematics-themed cohort have come to be more confident toward their own ability in mathematics but changed little in their attitudes toward teaching mathematics. These cohort students started with a positive attitude toward teaching mathematics and that remained constant through their three years in the program. At the end of the program students felt that they needed fewer experiences to learn mathematics content or

pedagogy. These surveys and focus groups were not done with any comparison groups. It is therefore impossible to say that any changes were a result of the cohort program.

Pedagogy

Each of the three sites visited had a different approach to establishing new norms of pedagogy. At Midwestern State University the students do not take their content-focused methods course until their program is half over. For the first three semesters, students observe and model the pedagogy practiced in the classroom. This pedagogy may or may not reflect ideas presented in the university courses. Since there is no mathematics education faculty member assigned to the mathematics cohort, except during their methods semester, it is unlikely that their view of pedagogy is sculpted by the university, at least in the first half of their program. Several faculty who have taught cohorts at Midwestern State University indicated that they felt the preservice students developed their own professional norms in the context of their field experiences. Since there is no consistent faculty leadership of the cohort, the preservice students are on their own. In focus group data before their megamethods semester, Midwestern students reported that, aside from trips to the NCTM meetings, they didn't see why this was considered a mathematics cohort.

At Southeastern the emphasis of the cohort is established early, in the first semester of the program. This is done through a methods course reflecting their area of specialization. Depending on faculty availability, this early methods experience does not happen with every cohort. Since the faculty member

assigned to a cohort reflects the content focus, the cohort develops a content focus even in the absence of an early methods course. This professor (or sometimes, graduate student) conducts weekly seminars, and is in the partner school once a week. These elements can serve to reinforce the expected pedagogical practice and allow the cohort to develop a norm of expected practice based on the interactions with their university faculty, colleagues, and inservice teachers.

The development of professional norms of practice at the Western University are enhanced through occasional meetings of the cohort. Students said these meetings address logistical as well as pedagogical issues. I attended one meeting in which a professional development expert briefly discussed science at the early childhood level and provided some sample lessons for young children. The meetings are facilitated by the university faculty supervisors. Students in the mathematics/science cohort expressed frustration at being at a language arts-centered school. They were faced with trying to develop their attitudes and pedagogy without access to a school-based model of what mathematics and science looked like in the classroom. The classroom teachers also expressed a desire to host a language arts-focused cohort. Both preservice and inservice teachers felt mismatched. The students wanted to apply and witness science and mathematics teaching as they learned it at the university. The teachers wanted their strengths in language arts to be valued more than their deficiencies in mathematics and science. It appeared that the students developed their

professional norms in sync with their university experiences and in opposition to their school experiences.

From the evidence gained through these site visits, I suggest that there are several elements key to establishing new norms of pedagogy in a preservice cohort. First there must be an early initiation into the pedagogy of the content area focus. The results are less pronounced at Midwestern than at Southeastern, where the science or mathematics theme is introduced early. Next, there should be strong faculty leadership of the cohort. At Western and Southeastern, a faculty member is involved from the start and participates in both field experiences and seminars. This serves to focus the cohort on their content area. Finally, there should be consistency of field experiences with university experience. Without these elements in place, cohorts may not support their members in teaching to new standards of pedagogy. Students who had field experiences consistent with their university experiences were more satisfied than those who did not.

Retention

Huey (1996) reported in her study of early Midwestern State University preservice cohorts, that retention was better for students in cohort groups than for those in non-cohort groups. But since Western and Southeastern only have one program type available to students, it is not possible to compare retention rates for cohort and non-cohort students. It is important to study retention at a more sophisticated level.

A critical issue for many teachers educators is the recruitment and retention of "minority" students (Boyer & Baptiste, 1996). Most of the preservice teachers I met and observed at both Midwestern and Southeastern were White students in their early twenties. The students at Western were more diverse. There was a range of ages from early twenties to forties or fifties. In addition, there were significant numbers of Latinos in the classes. There was an emphasis available in bilingual education and the program seemed successful in attracting students to the program. Unfortunately, no data were available on the retention of the minority preservice teachers.

University/school collaboration and relationship

At all three sites there are opportunities for a teacher, or several, to teach the cohort. At Western University, there is a university position for a teacher on special assignment. The teacher, on leave from the school district for the year, teaches various methods courses for the university. At Southeastern State University, there are teachers working as supervisors and at least one teacher (a media specialist) who teaches a class for her school's cohort. At Midwestern State University, several teachers with the mathematics cohort have taught methods courses and many others have made presentations in cohort courses. Teachers involved as clinical faculty expressed a range of opinions. All were flattered by their selection. Several indicated a desire to start or continue graduate work so they might eventually become regular faculty. With one exception, the clinical faculty felt respected in their work at the university.

While many preservice programs employ teachers as adjunct or temporary instructors, there is an additional benefit to the practice with a cohort program. At one site, students described their surprise at finding some of their cooperating teachers teaching courses at the university. The students shared experiences at the school and the university. Having teachers from their cooperating school as instructors helped students make connections between the two.

The cohort at each of these sites serves as a joint focal point for the university faculty and school teachers. Teachers report a sense of ownership and pride in the students at their school. Teachers at one site expressed some dismay when they found out a few cohort students would student teach overseas. Not only would they miss the students but the teachers felt they had an investment in the students. The faculty who facilitate the cohort groups work more closely with school personnel than is typical of many programs. At Southeastern State University and Western University, faculty members are in the schools every week. At Midwestern State University, the faculty also have more involvement with the schools, especially during the methods semester.

Cohorts can, and do, serve as a glue between the university and school. In each of the sites there was an intense relationship between the teachers and faculty mediated through a shared interest in the cohort. The university faculty saw the school faculty more often and shared some responsibilities with them. The school faculty also come to know the university faculty. At least two of the sites have joint research projects underway. At Midwestern State University

there are also study groups with participation and leadership shared by university and school-based faculties. Although at each site there were many teachers and administrators who seemed out of the loop, it is still reasonable to conclude that cohorts can bring the two faculties together in ways that have not been typical of traditional programs.

Discussion

Teacher education has been the subject of both internal and external criticism. Teachers feel inadequately prepared to meet challenges in the classroom (Rigden, 1996; NCES, 1999). One response has been the implementation of preservice cohorts. It is reasoned that cohorts enable preservice teachers to support each other as they create and participate in a community of learners. The purpose in this paper has been to explore the potential of preservice cohorts to contribute to preservice education, with particular attention to these questions in mathematics and science education:

1. What influence do cohorts have in the development of professional identity and attitudes about teaching?
2. What impact do cohorts have on the construction of knowledge of, and attitudes toward, mathematics and science?
3. How does membership in a cohort affect student understanding of pedagogy?
4. Do cohorts affect student retention at the university? In the first years of teaching?
5. Does the cohort improve or intensify the nature of the relationships between the university faculty, school faculty and the students?

The use of preservice cohorts in mathematics and science may improve the preparation of teachers through attention to a better understanding of

content and pedagogy, more positive attitudes, and participation in setting new professional norms. Cohorts could also address the issue of program coherence by providing students with the opportunity to experience, discuss, and analyze mathematics and science courses together. In order for this potential to be realized, university programs must structure cohorts to take advantage of the affective and cognitive dimensions of sustained cooperative learning.

Evidence from a survey of teacher education literature and the three site visits suggests that there are several important effects of preservice cohorts. Membership in a cohort helps preservice teachers develop a sense of community and confidence. At each site, and in the literature from educational administration, preservice students cited the cohort as the most beneficial part of the program. Cohort students bonded through classes, tests, and field experiences. In addition to improved professional attitudes, preservice cohort students developed positive attitudes about their content area. It appears from data from Southeastern that this benefit is limited to cohorts with a mathematics or science focus. Cohorts without such a focus do not improve their attitudes about teaching mathematics or science. Perhaps because of increased support and more positive professional attitudes, retention may be improved through cohort membership. Finally, cohorts are often part of a more extensive program of university and school collaborations. By providing a focal point for both institutions, preservice cohorts force more intensive interactions and familiarity between universities and schools. This could set the stage for more involved relationships between the faculties.

In addition to some of the positive effects of cohorts, there are other effects that are less than positive. Even though the content background of teachers in mathematics and science of teachers is thought to be inadequate, cohorts are not structured to help students learn more content. This misses an important opportunity to improve the preparation of preservice teachers. Programs would have to be structured differently if an improvement in content preparation is to be effected. Students would need to enroll in content courses together and engage in cooperative learning techniques before improved content knowledge could be expected. Faculty members and administrators with the two undergraduate programs suggested that this would be logistically difficult since it would require cooperation from a variety of departments and colleges. At Southeastern there is the added problem that many students enter the program as transfer students who have already completed many of their general education requirements. In the fifth year program at Western, the students have already completed their general education courses before they enroll in the certification

Faculty reports both from the literature review and site visits also paint some negative images that may result from a bloated sense of empowerment. Cohort students can become clique-ish, demanding, and elitist. Faculty spoke of having to chisel their way into the cohort. The faculty can become the outsiders with little effect on group norms. If one goal is to bridge theory and practice, cohort behavior, unless careful tended, can have a negative impact.

A profound difficulty emerged early in this study. Research on preservice cohorts proved to be limited in both amount and quantity. Detailed program descriptions and evaluations of innovative programs were scarce. Research was even more rare. As Houston noted, "Evaluations of the effectiveness of such programs [non-traditional teacher education programs] are virtually non-existent. Even the content of programs often is poorly chronicled. This led Houston to complain that the "'black box' of professional preparation experiences decries comparison" (1996, p. ix). It is hoped that future papers on preservice teacher education will have a more carefully documented literature from which to draw. It is critical to study these preservice innovations more vigorously so that increasingly embattled teacher education programs can defend and improve their programs based on solid research.

There are many issues worthy of study. At a core level, there is an assumption that preservice students learn from each other. What is not clearly known is what and how they learn from each other (Hawkey, 1995). More careful attention should be dedicated to understanding the relationships between preservice students in a cohort. How can they facilitate, or obstruct, each other's learning? How do they help each other make sense of their shared experiences?

Part of the difficulty in making recommendations about the use of cohorts in mathematics and science education results from the problems in isolating some of the variables involved. Cohorts are virtually always part of a larger reform effort that involves cohort use, expanded field experiences and curricular reform. It is difficult to dissect out the parts that are necessary for effective

structuring of preservice cohorts. The mixing of increased field experiences and cohorts is especially problematic. It is not clear if improved attitudes and feelings of professional preparation are related to an increase in comfort in working in schools or due to the support of a cohort structure. Since cohorts demand considerable resources, it is important to discover which elements matter and to what effect.

It was clear that in many ways, little attention was paid to the purpose and design of the cohort experience. Students were unclear about the purpose of the cohort except for a nebulous concept of "supporting one another." One fundamental weakness in attempts to reform teacher preparation is an attention to structure rather than to a reconceptualization about practice (Myers, 1997). If cohorts are taught in the same ways and have the same types of field experiences, then cohorts are likely to produce teachers who teach like those we already have. Cohorts would then be conservative structures. There is nothing magical in the structure itself, "Simply placing students near each other and allowing interaction to take place does not mean that learning will be maximized, high quality peer relationships will result, or student psychological adjustment, self-esteem, and social competencies will be maximized. Students can obstruct as well as facilitate each other's learning. Or they can ignore each other" (Johnson & Johnson, 1991, p. 2:3-4).

If students are to become part of a community of learners of mathematics and science, then the community will need to be carefully constructed. They are unlikely to develop the requisite goals or attitudes on their own. Researchers

need to generate more careful research and attend to these issues of learning in preservice programs. Developers of cohort programs need to pay more explicit attention to what cohorts are meant to accomplish. Otherwise preservice cohorts run the risk of becoming a distinction without a difference.

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INTEREST, IDEOLOGY, INFORMATION AND INSTITUTION IN A UNIVERSITY-SCHOOL PARTNERSHIP

A paper to be submitted to the Journal of Teacher Education

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Introduction

Over a quarter century ago, teacher educator Martin Haberman (1971) offered 23 reasons why universities cannot educate teachers. University and school faculties are incompatible, he suggested, because universities are entrenched in theory and school teachers are too conservative. Both faculties struggle to maintain their identity while pointing fingers at the other. In the intervening years, and despite considerable attention, many have argued that teaching remains roughly the same as it has been for decades (Sarason, 1990; Goodlad, 1990).

Why this immunity to change? The university and school camps are sometimes quick to blame each other (Teitel, 1997). The university faculty bemoan the intractability of school teachers to reform. Their tattered copies of Lortie's *Schoolteacher* (1975) rest on their bookshelves. Lortie found teachers to be conservative, isolationist, and present-oriented. How can reforms take root with teachers who like things the way they are and whose most pressing need is for a lesson to do on Monday? The teachers claim the university faculty are, at best, out of touch with the "real world" (Rigden, 1996). They believe that professors have not taught in a k-12 setting in years, if ever, and are so buried in

theory that they would have little idea what to do in a "real classroom." Some teachers might secretly relish the image of a university professor being devoured by kindergartners. To bridge these two views, reformers advance the logical, if unproven, idea that if true change is to take place that it must occur simultaneously (Goodlad, 1990; Clark, 1988; Holmes Group, 1986).

As one mechanism for this transformation, many schools of education have initiated some variant of a professional development school (Holmes Group, 1986) or clinical school (Carnegie Forum, 1986). The professional development school concept grew from a series of meetings of deans of colleges of education. They proposed professional development schools (PDSs) as places for the education of inservice and preservice teachers and where university and school faculty would undertake research of mutual interest (Winitzky, Stoddart, & O'Keefe). Clinical schools are similar in basic concept but draw more of their inspiration from teaching hospitals (Stallings & Kowalski, 1990). Their orientation leans slightly more to research. These forms of university-school collaborations, especially professional development schools, have proven popular and now number in the hundreds (Abdal-Haqq, 1991). While the manifestations of university-school collaborations may vary, their core goals are to improve K-12 education, establish a research base for practice, and develop structural changes that will encourage university-school collaboration for teacher development (Book, 1996).

The shared work between universities and schools represent a form of inter-organizational collaboration. Inherent in inter-organizational

collaborations is a set of challenges that extend beyond the purely logistical (Rogers & Whetton, 1983; Teitel, 1996). Universities and schools are organizations that have different missions, reward systems, governance, and financing (Soder & Andrews, 1984; Teitel, 1997; Trubowitz & Longo, 1997). Added to this mix are preservice teachers who, at least temporarily, represent the university but have aspirations to be part of the schools. In this paper, I explore different interests, ideologies, information, and institutional influences on a university-school collaboration. I examine the impact of these factors on the structure and relationships of interactions between university faculty, the school faculty, and a cohort of preservice teachers.

Conceptual Framework

Traditionally, decisions about preservice teacher education have been based in the university. The emergence of professional development schools has challenged this university privilege. This reform assumes that if control of preservice preparation is shared, teachers who are better prepared will result. The assumption is that teachers, university faculty, and preservice teachers bring different resources to the partnership and when their resources and experiences are pooled, teacher education will be improved.

Weiss (1995) described four elements that influence individuals as they make decisions in an organization. The 4-I's of decision-making are ideology, interests, information, and institution. Ideology, interests, and information interact and overlap each other. They are all embedded in an institution that

shapes their development and expression (Weiss, 1995). This model seemed particularly appropriate to apply to a university-school collaboration for several reasons. First, university-school partnerships require a significant level of trust and development of common goals (Levine, 1997). Trust and common goals must be negotiated through consideration of the interests and ideologies of all groups. Second, university-school collaboration "involves changing people's minds about ideas and beliefs that are closely held" (Levine, 1997, p. 6). Before a fundamental shift in ideology can occur, the existing and proposed values must be carefully mapped. Third, if the participants are going to make these leaps, they have to be convinced the changes are necessary. This requires that they must have information that convinces them of the wisdom of these changes. If research articles are used with teachers who may not value or understand the papers, they are unlikely to persuade teachers of the need for fundamental change. Finally, university-school collaborations mix two institutions that are quite distinct. These two organizations could have fundamentally different environments that would impact the success of a collaboration (Teitel, 1997). Therefore, careful attention to institutional factors is necessary. For these reasons, Weiss' model of the 4-I's seemed appropriate and useful.

Interests represent a set of factors that promote self-interests. For example, preservice student teachers may want good grades, decent classroom assignments, and a job at the end of their program. Teachers may be motivated by extra resources, pay, or opportunities for advancement. University faculty may define rewards in terms of tenure, career advancement, or research

opportunities. A project that blends teachers, students, and faculty must also accommodate and acknowledge these interests.

Ideologies are defined by the sets of values, principles, and philosophies embodied in the groups. In the schools, ideology may be manifested through teacher actions and beliefs. The ideology of teachers is represented by what they value and believe in. For example, in Weiss' study, she found that teachers valued order in the classroom and congenial relationships with other teachers while principals valued hierarchy and innovation. Ideology is important in this study because these fundamental beliefs shape participants' expectations for the project. For example, teachers could be expected to value student achievement and want the rant to be directed to classroom activities. Faculty may value research, however, and need the project to focus on facilitating research.

Weiss defined information as the "range of knowledge and ideas that help people make sense of the current state of affairs, why things happen as they do, and which new initiatives will help or hinder" (1995, p. 575). The sources of information to which individuals or groups attend indicate their perceived legitimacy. For example, teachers may consider their classroom experiences or other teachers as the most legitimate sources of information. University faculty may refer to research for their information. Information not only defines sources of data but also their authority.

Interests, ideology, and information are structured within an institutional context. The institution helps to prioritize and legitimize the other resources used to make decisions. For example, if a district tests and publishes scores in

reading and mathematics but not in science or social studies, teachers and administrators can assume that reading and math are priorities. The school staffs will interpret their self-interests, ideology, and information in that context. Similarly, if a land grant institution favors publication records over service or teaching, faculty will invest their time in writing.

Each of these factors interacts in decision-making. Each influences the manifestation or interpretation of the others. A teacher who believes in smaller class size may accept evidence supporting that conclusion but may reject any evidence to the contrary. A professor who is a constructivist may dismiss research supporting direct instruction. Ideology can filter information. We are more likely to attend to information serving our own interests.

Research Methodology

Weiss' study investigated the effects of ideology, interests, information, and institution on the implementation of shared decision-making in twelve US high schools. Shared decision-making represents a shift in decision-making authority from the principal to the school staff. This study examines a different shift in authority -- from university-based teacher education to a shared responsibility with schools. The focus is on the ideology, interests, and information within two separate institutional settings with at least three distinct groups of people (school staffs, university personnel, and preservice teachers). The purpose will be to look at the relationships between the university and school interests, ideology, information and institutions.

Context

The School-University Mathematics Initiative (SUMI) is a collaborative project of Lincoln-Forest Elementary Schools and the Department of Curriculum and Instruction at Midwestern State University (pseudonyms have been used throughout this paper). SUMI is a mathematics-focused cohort from Learning in Context, a professional development school program at Midwestern. Preservice teachers applied to the program at the end of their freshman year. Those accepted formed a cohort of 31 students in the first semester of their sophomore year. There were originally twenty-nine elementary education majors and two secondary education students. Cohort students completed their major classes together and undertook a significantly expanded program of field experiences. Since these field experiences occurred at the paired elementary schools, the students became a part of the school community. The partner schools, Lincoln and Forest, are elementary science and mathematics magnet schools. Lincoln is a preK-2 school while Forest has students from third through fifth grades. As magnet schools, Lincoln and Forest have more resources to teach mathematics and science.

Funding from a corporate education foundation provided a substantial level of resources. Largely because of the funding, SUMI had a significantly broader staff development component than other Learning in Context cohorts. Teachers had the opportunity to purchase mathematics supplies, attend national and local conferences, take Midwestern courses, and develop their own study groups. A cornerstone of the professional development model was the emphasis

on developing a collegial atmosphere both between the school and university and within the group of preservice teachers. Learning in Context represented Midwestern's attempt to develop a professional development school, "A basic component of Learning in Context is the development of a sense of community within the student cohort and between the cohort and the faculty, staff, and students of the partner school district and faculty of the College of Education" (Huey, 1996). Although the program has evolved, the original design borrowed liberally from both Goodlad and the Holmes Group (Faculty Report, 1993).

I have been involved with the grant almost since the beginning. I was a science teacher at Lincoln and gradually became more exclusively involved in the SUMI grant. I helped to write it, administered it at the school, served as a liaison to the university and foundation, and taught elementary science methods at Midwestern. I taught science methods to the SUMI cohort.

Approach

The purpose of this study was to describe and investigate the impact of interest, ideology, information, and institution on the relationships in a professional development school. The expression of these factors will be explored as they apply to some propositions suggested by the goals of the SUMI grant and its position within Learning in Context.

Lee and Yarger (1996) provide an overview of the many modes of inquiry that characterize the study of preservice teacher education. Since many current topics in teacher education research involve the reform of complex organizational relationships and contextual factors, case study research has

become a prominent method (Yee & Yarger, 1996). This trend is underscored by the predominance of case studies in organizational research (Lee, 1999). The issues and organizational relationships of this study suggested the use of a case study approach.

Yin (1989) defined a case study as "an empirical inquiry that: investigates a contemporary phenomenon within its real-life context; when the boundaries between the phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (p. 23). Since this study involved a contemporary university-school partnership with many individuals (teachers, undergraduates, and university faculty) who represented two major institutions (school and university), a case study approached was employed. Other approaches, ethnography in particular, could have been appropriate as well. While ethnography could prove useful for someone else to do, I could not do it. I was much too close to the project. For that reason, all of the data analysis was conducted after I severed formal ties to the project. My involvement with the project led me to rely on data from documents, interviews, or focus groups that were conducted by others. I could not do the interviews or observations because I was seen as a primary actor in the project. There was a danger that teachers would want to spare my feelings or fear that the information would be relayed to the principal. In fact members of one focus group asked the facilitator if I would have access to the information because they did not want to hurt my feelings. There was a danger that respondents would be selective in what was said. That made an ethnography an inappropriate choice for me.

A tension between my role as a researcher and participant emerged even though the data analysis, and some data collection, occurred after I resigned from my position. As a teacher at the Lincoln-Forest, I had a history with, and loyalty to, the teachers. One of their perpetual concerns is that time is wasted in meetings and attending to issues of little interest to them. They were protective of their time and I was sensitive to that. But as a researcher, I needed their time. My needs as a colleague and researcher clashed. Tensions also arose with my university function. I taught at the university and helped to implement the grant. I also felt loyal to my colleagues at the university. Because of the outside funding, I felt an internal pressure to emphasize the positive. I also wanted to protect the feelings of those with whom I worked. I tried to resolve this by emphasizing roles of people in the institution rather than about individuals. Even so, when I received comments back from member checks, each one had a comment that sounded, to me, to be defensive. Finally, a third tension resulted from having a doctoral committee with three members who had some involvement with this project. It was not the obvious problem (saying things to please them) that was challenging. The difficulty was that I decided not to interview any of them. It was too awkward to include quotes in my research from people who would be judging it. Therefore their perspectives are missing. Despite some of these tensions, there was also an advantage to having such a close tie to the project: I knew it very well. I knew the subtleties and complexities of the project. In the words of Geertz, I could usually tell a wink from a twitch (Geertz, 1973) . I could often detect when something was said but not meant or

meant but not said and then get clarification. This would not be possible without an understanding of personalities, roles, and institutions.

Propositions: Rationale and logic

In an attempt to systematize the case study approach, Yin (1989) proposed a structure for case studies. He listed five components of case study research design: question(s) to address, a set of propositions or assumptions, defining the unit(s) of analysis, and criteria for interpretation of data. In the following sections, the study was organized into the categories proposed by Yin.

The organizing research question for this study is: How do interest, ideology, information, and institution impact the relationships between the schools and the university in a university-school partnership? This question, together with the goals of the SUMI grant led to a set of propositions. Propositions, according to Yin, provide direction to the research question.

1) There must be some benefit to the schools and university. The partnership must serve the interests of the participants. The school faculty must expect that their needs (for example, time and other resources) will be addressed. The university faculty must also expect benefits. They may have more control of field placements as well as access to classrooms for research. The university might also have a "trophy" for public relations efforts (Teitel, 1997). The students, since they enter a program with increased demands on their time, must also expect a reward. This might take the shape of increased chances for a job, a better learning environment, or other improved opportunities.

2) The preparation of new teachers has traditionally been the responsibility of the university. Teachers may consider it to be a part of their professional responsibility but not part of their job. Yet both schools and universities have a major stake in the preparation of preservice teachers. Both should have a major role and commitment to the education of teachers. Therefore in a university-school partnership, both the university and school faculties should have a shared responsibility to the preparation of the students in the cohort.

Shared teaching is a goal of the grant as well as a hallmark of many professional development schools. Shared teaching can take several forms. A university professor may teach or assist in the K-12 classroom. A K-12 teacher may teach or assist in a university class. In the extreme, a university faculty member may take charge of a K-12 class or a classroom or a teacher may teach a university class.

3) There is often a wide gulf between research and practice. Teachers often do not have access to current research or dismiss it as irrelevant and impractical. University faculty bemoan the lack of interest in, or application of, current research. One solution to this would be to jointly undertake research. This could provide teachers with valuable information and provide university researchers with a better understanding of schools and teachers. Consequently, the types of research coming from the university faculty should look different than it looked before the collaboration. A tighter classroom focus might be expected.

Unit of analysis

Yin (1989) suggested that case studies often suffer from careless delineation of the unit of analysis. As in many case studies, the unit in this study has blurred boundaries. The core groups were relatively easy to isolate. They were those who had a major role or stake in the SUMI project. This included the teachers and administrators of Lincoln-Forest Elementary Schools, the university faculty and the SUMI students from Midwestern. But there were many factions outside the core groups that could have important consequences for the collaboration. Each of the core groups was influenced by other factors such as administrators of different types, budget allocations, the funding agency, licensing or accreditation agencies, etc. The influence of these must be considered but was not the focus of the study.

Criteria for interpretation and data collection

As much as possible, multiple lines and points of evidence were used. A number of different people, in different and similar roles, were interviewed. Each was interviewed once. These included teachers, principals, undergraduate students, and university faculty. Seven teachers were interviewed by a Midwestern graduate student. The interviews were audiotaped and then transcribed. Their names were removed from the transcriptions. They were chosen because they represented a range of involvement in the SUMI project. Three were heavily involved with the project through either leadership roles or participation in many activities. One was minimally involved by attending short inservices at staff meetings. Three were moderately involved. They had

no leadership roles in the project but did participate in a few classes or mentored undergraduates. These sessions included questions centered around their degree of involvement in the project, their perceptions of its advantages or disadvantages, and their ideas about the university-school relationship.

Three undergraduates were interviewed. Although I had preferred that someone else interview them, for logistical reasons I conducted the interviews. The interviews occurred after their methods semester. I taught one of their methods courses and did not want them to feel pressured to give a "right answer." Notes from these interviews were handwritten. Although I had hoped to get a range of students in this sample, each of the students interviewed held leadership roles of some sort within the cohort.

I interviewed two university faculty. Both had taught at least one cohort class but neither were significantly involved with the SUMI grant. One was interviewed over the phone, the other was interviewed via electronic mail. The faculty were asked questions about their impressions of the students, the grant, and the students' field experiences.

In addition to the interviews, staff members of the Institute for Research in Education Studies (IRES) conducted a series of focus groups. All focus groups were audiotaped and then transcribed. All remarks that personally identified participants were removed. The teachers' focus groups included all teachers at both schools as well as both principals. There were two groups conducted at each school with about ten teachers per group. The focus groups were conducted at the end of an intensive, six week field experience for the SUMI students. The

university focus group included the four instructors who taught SUMI students during the same semester.

There was a rich variety of material about SUMI student thoughts and progress. First, the students participated in focus groups at two different points. The first set of focus groups took place during finals week in the semester before methods. About half of the students participated. There was a second set of focus groups at the end of their methods semester. All except one of the students were present for these focus groups. Each group had about ten participants. Second, the SUMI undergraduates also had a mid-semester debriefing during their methods semester conducted by a senior faculty member who was not involved in the grant or in teaching their courses. Third, the SUMI students were "poked, prodded, and weighed" at many points during the course of the grant. I had access to course evaluations, surveys, and a variety of other activities that provided insight, or puzzlement, about their thoughts.

Focus group leaders asked participants to suggest different strengths, possible improvements or suggestions for the project, and their views on the collaboration. IRES conducted the focus groups as part of an ongoing evaluation effort for the grant. The primary purpose was not to inform this research project. This did not prove to be a major obstacle for two reasons. First, as a member of the evaluation committee, I had considerable input into the construction of the questions. Second, the evaluation effort included many of the same issues addressed in this research project. What was more problematic were the teacher focus groups. They were facilitated by four different people. The four varied in

their approach to facilitation. Two facilitators directed their groups very little. These groups provided less valuable information because they got stuck on a few topics, notably the budget, and became redundant. One facilitator, the leader of the IRES evaluation effort for SUMI, led the faculty group and all of the student focus groups. These focus groups provided the most valuable information because this facilitator knew the project well and could ask follow-up questions for more depth.

A variety of different documents were examined. These included meeting announcements, agenda, minutes, teacher contract information, district requirements, project newsletters, the grant application, annual grant reports, university materials on teacher preparation, and program descriptions. These materials were approached according to the process described in the next section.

Data analysis and quality assurance

The research questions and propositions suggested the construction of categories in the process of "selective coding" (Lee, 1999). First, I segregated the information by group: students, faculty, or teachers. Second, I read through each group's interviews, focus group transcripts, and other documents. As I read through the material, I coded the information as interest, ideology, information, or institution. After I had categorized all of the relevant data, I went through each group (student, teacher, faculty) and each of the 4-Is in order to determine a pattern or theme. For example, I went through all of the material related to the preservice teachers to determine if there was a consistent pattern to the expression of their interests. For example, as I read through the focus group data,

several students mentioned grades. They mentioned grades in different focus groups and student meetings. Grades were also mentioned in course evaluations. I also looked for remarks that contradicted this evolving sense of grades as an important interest of the students. How did other students react if someone brought up grades. Did they downplay the importance or confirm the interest in grades? Since they did not, it appeared that grades were a consistent interest within the cohort of SUMI students. I did the same for each group for interests, ideology, information, and institution.

It was not surprising that students were interested in their grades. Despite this rather predictable conclusion, it also illustrated a basic and recurring problem. As I attempted to classify items, they spilled over into other categories. Grades transcended a simple self-interest. The *interest* in grades was imbued with an *ideological* belief in fairness. The ideological belief in fairness was supported, in part, by *information* supplied by their peers. Finally, this information, interest, and ideology help to frame their notions of *institution*. While their ideas about grades were complex enough, most of the concepts were more difficult to categorize. When concepts spilled over into two or more categories, I tried to find the most natural fit for the concept. If two or more categories seemed equally appropriate, I placed it in the category that proved more helpful for analysis. For example, fairness for students could reasonably be placed in "interest" or "ideology." But since fairness fell more cleanly into ideology for the university faculty, it was more useful to place it into a comparable category. This facilitated the comparisons. Despite the difficulty of

categorizing these complex concepts, it was still productive. Decisions about categories forced a preliminary analysis and required me to constantly zoom from the microscopic details to the macroscopic storyline. It underscored Strauss and Corbin's point that "Analysis is the interplay between researchers and data" (Strauss & Corbin, 1998, p. 13). Weiss' "4 I's" provided a useful tool but it constantly required judgment and interpretation.

Validity was an important consideration in a study of such complex issues. I maximized validity by establishing clear research questions and propositions. A systematic effort was made to identify the types of evidence and changes to be studied. Evidence from a reading of the relevant literature provided suggestions about the types of evidence to expect. This proved to be an ongoing process. As the documents and transcriptions were read new lines of evidence became apparent. At each of these times, I established the logical connection of the data to the category. Validity was also strengthened through the use of multiple data sets and sources. Data came from a host of documents, focus groups, and interviews. In addition, these sets of data were shaped by many different people -- from the authors of documents to the focus group facilitators. Each of these lines of evidence was used to check the consistency of the data. For example, the SUMI students' opinions of their cohort vacillated over the semesters. Any conclusions about student value for their colleagues had to be tempered with the ebb and flow of their relationships. Finally, four colleagues, one teacher, two university faculty, and one SUMI student, graciously agreed to read an earlier draft of this paper. They were asked to check for

accuracy of details and for logic and interpretation. While most comments were minor, the few major disagreements are treated in the text.

Reliability was be maximized through maintaining clear records with a thorough description of how they were analyzed. For example, for the transcripts of focus groups, I have the original transcriptions, then I have a coded version in which comments are categorized. Finally, I made notes about the rationale for these categorizations.

This type of research project involved several difficulties. The fact that many of the people discussed in this study are colleagues and friends injected a need to be both honest and diplomatic. Other studies of teacher education have reported similar conflicts and may have led some researchers to emphasize the positive (Lee & Yarger, 1996). Any weaknesses that are found were discussed in terms of the possibilities for improvement rather than a personal criticism. Anything that clearly identifies an individual does not appear in this paper or any publication. There was also the risk that teachers, fearing I would interpret it personally, would avoid any criticism of the project. Overall, there could be a tendency to underestimate the negative. One feature that served as a check is the focus group study conducted through IRES. If participants' comments to the leader of the focus group, who is someone unknown to them, corresponded closely to other sources of information, then it can be assumed that the information is accurate. There was still the danger that participants would be cautious with IRES as well since it is part of the university. Given the structure of the grant evaluation, however, this was unavoidable.

Preservice Teachers

The preservice teachers from Midwestern are in a unique position. Since they spend about 300 hours at Lincoln and Forest before student teaching, they become part of the school community. But preservice teachers are also members of the university community through their coursework and other interests.

Interest

A passionate interest of the preservice teachers was to be respected by both teachers and university faculty. They appreciated the way teachers welcomed them and incorporated them into the classroom. The teachers demonstrated their trust by providing students with opportunities to practice teaching or by including them in their conversations and meetings. Students were less thrilled by their treatment at the university. The juxtaposition of feeling like a teacher for three weeks, then being a student again was difficult. "It was hard to come back after being a teacher in the field for three weeks and then come back to be a student again." Another student was even more vehement. "They [faculty] expect us to be professionals in the field but don't treat us that way when we get back [to the university]." The transition between being a teacher and a student was clearly difficult.

Students were hesitant to stand out within the cohort. It was in their interests to be congenial, collegial, and on an equal footing with others in the cohort. Students who assumed leadership positions opened themselves to a barrage of criticism such as, "He is trying to run the show," and "Eric has taken over the cohort." Students who were leaders seemed, more by their position

than their obvious actions, to violate the code of equality. Students were not explicit about what the leaders were doing that generated this attitude. I asked one leader what he thought provoked it. He threw his arms in the air, exasperated and said he didn't know.

There is no other single issue that commanded as much attention from the cohort as interpersonal relationships. Students frequently mentioned cliques and strong-willed, rude individuals. Their dissatisfaction with cliques permeated the focus group data and interviews. It was even mentioned in several course evaluations. When disapproving of others' behavior, harsh words popped up like "immature," "junior high," and "thirteen-year-olds." Students often mentioned their improving abilities to work with others in the cohort as evidence of personal growth. These attitudes seemed to shift with the semesters. There was an initial period in which relationships were tentative and tough. This evolved into open hostility. Three students reported later that they came close to leaving in the first year. By the end of their second junior semester, things seemed to have calmed. Students were optimistic about the value of their relationships within the cohort. This emotion eroded during their methods semester. Focus group data supported my observation of the vans traveling to their field experiences. In the first few weeks of their field experiences, the vans were full. By the end of the field experience, students were commuting in individual cars. The faculty noted this in their focus group discussion. Faculty had never before witnessed this level of hostility with students refusing to work with certain others.

Despite the equality expected within the cohort, students thought of the cohort itself as an elite group. For example, in a pamphlet prepared for a national conference, students referred to the cohort as a model for mathematics preparation and "selective." In focus groups, students referred again to the cohort selection process as "demanding" and "elite." Students' interests were served by being part of a select group but they were uncomfortable with any individual standing out within the group. In reading this section, two colleagues remarked that this was inconsistent. I do not believe it is, however. In a group that considers itself as special, they may feel uncomfortable, perhaps even jealous, if some are brighter than others.

The students' self-interest was also in getting decent grades and being prepared to get a job. In a geographical area with a tight market for teachers, students wanted to be attractive at the end of their program. They believed that this project would give them that edge, "because this is such a big, huge program that we did in college... we can really go into detail [in a job interview]. Like we had practicum starting in our sophomore year and the best teachers... I think it will help in getting a job." The student recognized the advantages of the program in getting them something of value at the end: A job.

The students saw the opportunities afforded by the project and grant as significant factors in their own interest. "I think we need to realize that we have this opportunity because I don't think everyone in the cohort really understands the opportunities that we have." They concluded several focus groups with that reminder.

Ideology

One aspect of the students' ideology was evident in the value they placed on cohort membership. They appreciated the other students and used them as resources. "You know the people you are working with so you can work with them on another project and not have to worry about anything besides schoolwork." They valued working with others -- other students, teachers, and faculty members. The reputation of the group was very important as well. In one case a fellow student was habitually late for class and missed several field experiences. Students were livid. They were distressed that this student had tarnished their reputation. Their concern with the group reputation expressed a growing sense of themselves as professionals who followed some unwritten code of conduct. When another student went shopping instead of attending NCTM conference sessions, fellow students were disturbed by her "lack of professionalism." Students expressed concern with how behaviors would "reflect" on the cohort. Yawns in faculty meetings, being late, chewing gum, inappropriate attire, and driving a university vehicle too fast were all occasions in which students were concerned with their reputation. The students expressed it in terms of their professional reputation. Faculty members called it "tattling." Faculty members were distressed with the number of times students told on each other. It simply did not happen with other undergraduate groups. Faculty members in the methods courses wondered if students should be expected to take care of these issues themselves.

The preservice teachers also expressed their satisfaction with the ethic of caring. They especially valued their elementary students and the ability to teach them. "Being in the second grade class makes me feel alive and needed." They considered their work in the schools as a very serious undertaking. They were excited when their elementary students learned something in a lesson or when they were able to help the teacher. Many teachers commented on the fact that many preservice teachers returned to the schools on their own time to help with field trips or projects.

Information

The preservice students placed a premium on experience. They trusted experience as their primary source of information. Their experiences in the classroom were especially potent. When the students were asked in a focus group what the best part of the program was, they volunteered, in unison, "field experiences!" They enjoyed being in classrooms, working with children, and learning about the staffs. "The best thing was being able to see behind the scenes. To see what happens in staff meetings. The background behind it all. What takes place when they decide to hire and fire, etc." Their journals in their science methods course also chronicled the development of this ease and comfort in the schools. The SUMI students became fluent in "teacher talk." The talked about things such as routine paperwork procedures, details of district testing, and yard duty assignments in ways that students in the regular program did not.

The extensive experiences in the schools provided students with a collection of experiences that informed their sense of teaching. The students felt

that these experiences were not valued by their university professors. "I'll be the first to admit that my lesson plans bite the big one. But the ideas work in the field." Another student observed that she presented a lesson in her elementary class that worked well. When she submitted the lesson for her methods course, she was told it would never work. In addition to their own experiences, students trusted the experiences of teachers as a guide for themselves. "I was working with someone who was really old-school with worksheets and transparencies, but he made it work, he really did." Students valued what "worked" in their field experiences and trusted their cooperating teachers. Information from the university needed to validate these experiences or it was suspect. For example, many students complained about university assignments that were difficult to complete in the field. A notorious example was a map and globe lesson from the social studies methods instructor. As a part of the course, she required the SUMI students to develop and teach a map and globe lesson. The students complained that their teachers did not teach this in their classes. They implied that the lessons could not be important or "developmentally appropriate," if classroom teachers did not teach them. The social studies instructor regretted that this assignment became an "intrusion" into the classroom.

The students valued each other as sources of information. Students often talked about how much they learned from each other. They seemed to accept all types of information from each other from licensing requirements to classroom issues. In a focus group discussion on grades, a student offered that she had heard that principals won't hire students with high GPA's. They are apt to be too

much of a perfectionist, she explained. Many members agreed that it made sense. One had also heard that from another source. Students would often believe what other cohort members said.

Institution

Students were working in two organizational environments but aspired to be part of the institution of schools. Given their predilection to trust experience in the schools, together with their career plans, it was not surprising that students aligned themselves with the schools. "I think its kinda neat, because you are in the same schools... with the same teachers...you get familiar with the area that you are in and the students, and the teachers." They sometimes portrayed the institutions as being opposed to each other. Students began to feel "out of touch" with the university as they spent their first three weeks in the field. The students also felt that the university was out of touch with the schools and unreasonable in their expectations. This became particularly important as the students discussed grades. The students felt that their experiences in the schools were primary but their university professors knew little about them, "the tests don't assess what we learned." They contrasted their school experiences with those from the university and the university came up short. "We get real experiences that you can't get out of a book." The students were upset that faculty came to supervise and make comments based on a single, short observation. They were equally upset that their field work was not considered in course grades.

Three teachers from Lincoln, myself included, were hired by the university to teach in the university. There were many others who guest taught one or two lessons. In some ways this was successful because students appreciated the infusion of "real life" into their courses. One student commented favorably that it was exciting to use the same books in class as they use at the school site. This was also appreciated by the author of a report to the Foundation, a tenure-line professor, who commented on the fresh perspective offered by these clinical and guest teaching assignments.

But in some ways the practice backfired as students saw the authority of the clinical faculty members in terms of their experience in schools rather than in any academic preparation. "And she [clinical professor] taught me more about culturism [sic] than I learned in 406 [Multicultural Education] because she has been in the school... and she told us, this is how it is and this is how I reacted and you can act the way you want to." A clinical professor was "fresh with what works and doesn't work. Whereas an older professor, they don't know the recent... what will work and not." Instead of integrating the schools and university, in some ways clinical faculty widened the gulf.

The students planned careers within the institution of schools. Therefore it is not surprising that they also shared many of the same interests, ideology and information as the school teachers with whom they worked.

Teachers/School

The teachers at Lincoln and Forest had a close relationship with several teacher education programs at Midwestern before the grant started. They hosted

a special student teaching program, an afterschool program in mathematics and science, and a summer institute for teachers. Many teachers had also received undergraduate or graduate degrees from Midwestern. There was a degree of comfort in working with Midwestern that facilitated, and perhaps hindered, the project. On one hand, there was comfort, familiarity, and trust. On another, there was an established pattern that was quite traditional.

Interests

A fundamental interest of the teachers was the need for resources. These resources assumed a variety of forms. Time was a precious resource. Teachers wanted time to plan and think. They also wanted financial compensation for extra time. They were paid for conferences, workshops, study groups and work groups through grant funds. But above all else, teachers wanted supplies for their classrooms. Time and again, teachers responded that they appreciated the math manipulatives they were able to purchase with grant money. "I know that teachers have been very appreciative about getting all those [manipulatives]. Extraordinarily appreciative." Several teachers also valued the "training" that accompanied some of the materials.

The SUMI students were also recognized as a resource. Teachers reported that having a student in the class was a lot of work but that the trade-off was that they had "another pair of hands." This was especially pronounced during the methods semester when the undergraduates were at the schools for two three-week sessions. The students became more valuable as they became more familiar with the school. "It was great to have an extra pair of hands... they

[SUMI students] were helpful because they got to know the routines and could pick students up." Teachers were not accustomed to extra help and enjoyed it when they had it.

Many teachers felt their interests were met when they participated in activities that could be immediately put to use. They appreciated leaving with "something we can use right away." In a similar vein, the teachers liked classes and workshops that were practical. By practical, teachers meant that classes were relevant to their immediate needs in the classroom. Teachers wanted classes and events that addressed their classroom experiences. Announcements for the university graduate courses emphasized that the class would be "practical" and practitioner-based. Otherwise, grant administrators feared that teachers wouldn't consider taking a college-level geometry or algebra class. In one focus group, a teacher suggested, with some support, that we, "eliminate one of the classes and use the money to take people to the NCTM." Her point was that material from the NCTM conference would have more immediate application. In order to counter that sentiment and get enough enrollment, the classes had to be tailored to classroom practice.

Teachers appreciated the respect and consideration shown to them by people involved with the grant. A number of people in interviews, focus groups, and in minutes from meetings noted the distance and time that university faculty took to come to Lincoln and Forest to provide classes or join meetings. In an end of year report, it was noted that a lot of time was spent on the freeway that connected the university with the schools. Teachers also felt

respected by the Foundation. "It is validating to have a big corporation recognize our work. They seem to know that we are professionals." Teachers appreciated the consideration of their time and professional efforts.

Ideology

It should not be surprising that teachers placed a high value on learning. Teachers spoke about learning in a number of contexts. They were concerned with learning for themselves, learning by their own students, and learning by the SUMI students. One even mentioned how much Midwestern faculty have learned.

Many teachers placed a high value on their own growth in mathematics education. One teacher, who had enrolled in several classes, volunteered that, "It stretched my math ability. And I appreciated that." Several said that mathematics had never been a favorite subject but they came to feel more comfortable with it and even enjoy it. One teacher said, "Everyone has learned different strategies. Our classrooms are night and day different." Many teachers felt that they learned more mathematics as well as how to teach it. A second year teacher who had braved several graduate courses and other grant responsibilities volunteered that she now identified as a math teacher, not just as a first grade teacher.

The teachers also spoke about learning by their own students. They felt better prepared to teach mathematics and believed that their own practice was improved. Another teacher appreciated support to work on what she believed to be a very weak Kindergarten curriculum. "Our students are going to have a

much better experience that will be more challenging and help them more in first grade." Many comments included a direct or indirect reference to how their classrooms might be affected. The references were positive. They expected that student learning would be improved as the teachers learned more.

Information

Teachers' primary source of information came from their own observations and experiences. When situations arose in faculty meetings or grant meetings that required a decision to be made, teachers supported their opinions based on personal experience. "The Marilyn Burns workshop was good because the lessons and books I got worked in the classroom." They always preferred to spend money on teacher-proven materials than on a workshop or conference that was unfamiliar.

Teachers also trusted the experiences of other teachers and, occasionally, other schools. At one point, teachers at Lincoln questioned the value of the participation of a faculty member from another university. It was decided to keep the relationship going, at least as a trial, based on support from his cooperating teachers. On several occasions, teachers from Lincoln or Forest visited other schools to get ideas or see a certain practice. Teachers were particularly prone to trust information from schools with a comparable student population. If the school population was different from the Lincoln-Forest inner city experience, teachers were likely to suspect that, "Yeah, it will work there but not with our kids." Experiences from middle-class schools were treated with some skepticism but those from inner city schools were trusted.

Teachers appeared to accept what other individuals said but they rarely, if ever, cited information from research or articles. They did not refer to information from the district either. The principal from Lincoln, however, mentioned the Holmes Group several times, the funding agency even more, and the district. The principal from Forest was unlikely to cite research or articles but was often concerned with information coming from the district or her classroom teachers.

Institution

This project was grafted onto an existing and complicated institution. One of the goals of the project was to grow a professional development school. Implied in that process was some sort of shared decision-making. This was made difficult because the College of Education and the schools had obligations that extended well beyond their own boundaries. For example, the College of Education was bound by requirements of the state department of education for the licensure of the graduates. This limited the range of decisions to which teachers could contribute. On the other side, the teachers were bound by contractual agreements that the university could not participate in. In addition, the norms and governance of the schools were embedded in a long history that made changes in decision-making difficult.

The primary institution for teachers was the school. They had no interest or investment in sharing or changing school structures to include the university. Initially, they were even skeptical of involvement with the university. In the first faculty meeting describing the process of the grant application, teachers

wanted to make sure that the university was not driving the whole process. Teachers needed assurance that the school would have control over its own participation.

The two schools involved in this grant were paired magnet schools that shared an attendance boundary. Lincoln was a K-2 school and Forest had students from third through fifth grades. Despite this close arrangement, the schools often expressed open hostility toward each other. While the schools had shared a principal until about six years ago, the arrangement was untenable due to the antagonism between the schools and now they each have their own principal. The principal at Lincoln initiated the grant with Midwestern and did not share any control or news of the grant-writing with Forest. The staff at Forest first heard about the grant after it was already awarded. They were quite suspicious of the Lincoln principal and her motives. Initially, they were not sure they wanted to participate.

The principals had a much broader institutional network. Their first priority was their individual school. But they also had to consider the district. They were conscious of what the schools wanted and what the district required. If there was a conflict, the district won. This was especially transparent with magnet school issues. The magnet subsidy was in constant jeopardy and the Lincoln principal vetoed several teacher requests in fear that magnet money might be compromised.

The district had influence over the grant in several ways. This was primarily reflected in the concern that principals had to keep the district happy.

The most significant impact the district had was in the control over the budget. It was easier to have the grant money remain at the university. This would have simplified accounting procedures. But the teachers, school administrators, and district administrators wanted control over the school-based half of the budget. Given that this was a university-school collaboration and two site-based people were co-principal investigators, it was reasonable that half the money be under the direct control of the schools. Unfortunately, when the money came to the schools it was under the budget guidelines of the district. The district required certain budget categories that were not planned into the grant. They did not recognize others that were. Resources were dumped into categories that did not match the grant allocations. It became difficult to reconcile budget reports for the grant and the district. At times, the district budget office became a third partner in the SUMI project. The principal at Lincoln, who was in charge of the school portion of the SUMI budget, was caught between representing the school, grant, and district.

This project took place in a complex institutional environment. The teachers were allied with their own schools; the district saw the grant as extra income; and the principals had to negotiate the territory between the schools, district, and university.

University Faculty

The SUMI project was integrated into a larger program in the College of Education, Learning in Context. Consequently there were several layers of

faculty participation. There were administrators associated with Learning in Context. They had some administrative control over structure of the undergraduate program but no major investment in the grant. There were also about nine faculty members who taught cohort classes. But there were only two professors who participated significantly in the grant. One served in a leadership capacity and with the undergraduate cohort. The other became more involved in the school as well as with the cohort.

Interests

As part of a Research I university, the faculty members were interested in research. The project provided opportunities to conduct research and produce publications. Some of these research projects involved students and teachers. The students were required to take a course on action research and they conducted an action research project with a teacher in one of the partner schools. There is currently a collaborative research project under development in which individual faculty members will pair with a teacher and design and complete a research project. Since the teachers have little or no interest in publication, the faculty members volunteered to do the writing.

Evaluation was an important consideration for the university side. The Foundation expected a detailed evaluation. This project was its largest national grant so it expected substantial accountability. The university hired a research institute, IRES, to help construct and conduct the evaluation. The schools saw this as part of the university research function and did not want to contribute funds toward the evaluation. An evaluation committee was formed that

included school staff but they gradually stopped attending meetings. Indeed, in some ways the district tried to protect the schools from unfettered evaluation by the university. The district evaluation and assessment office required approval of all instruments used in the schools. They required many changes before several of the surveys and other tools were approved.

An important interest of the university was to get appropriate placements for the preservice students. Since the students spent a significant amount of time in the schools, the placements were considered especially important. One faculty member along with several teachers spent a lot of time matching students with appropriate teachers. Students with weak organizational skills were placed with teachers who could model it. A student with an off-beat personality was placed with teachers who were less traditional or judgmental. This level of consideration in placements was not remotely possible in the regular teacher preparation program.

Occasionally there were interests at the university that conflicted. SUMI was part of the Learning in Context program but was funded separately. Sometimes those involved in SUMI had to ask permission of the Learning in Context steering committee to do things differently. Sometimes permission was granted, other times it was not. The rationale was usually not what was best for SUMI but rather in maintaining the structural integrity of Learning in Context.

Ideology

Methods faculty members believed that there was a certain level of knowledge that preservice teachers needed. If the students did not receive the

same level of coverage as students in the regular program, the faculty felt that their professional integrity was compromised. "The task is really to make sure that the students get the same at least, if not more, information than they get in the regular program." Anything less was "unethical" or "professional malpractice." This proved difficult because the time students spent in the field was taken out of the time they had in class. During the methods semester, students lost six weeks of university class time. In the earlier years of Learning in Context, it was assumed that teachers would teach what the students missed in class. This was a naive assumption according to faculty members who had been involved from the beginning. In reality, some content the university faculty valued (such as map and globe lessons) were not necessarily taught in the schools at all.

Although content integration was one of the major themes of Learning in Context, the university faculty valued their own separate content areas. The grant writers suggested that mathematics would permeate the undergraduate classes as a theme. The course syllabi, though, made no obvious reference to mathematics as a unifying theme. The methods semester was an exception. The non-mathematics methods instructors did organize assignments around mathematics.

Faculty also expected professional autonomy. They taught their own classes with materials and syllabi that they designed to meet their own standards. The grant proposed that the faculty members teaching the SUMI students would "infuse mathematics" into their curriculum. The mathematics educator, an

untenured assistant professor, lacked any authority to require professors to orient their courses toward mathematics. As a result, the SUMI undergraduates, in a focus group before their methods course, wondered what made them a "math cohort."

The university methods faculty believed, as did the students, that grading should be fair. Their standards were different, however. While the students thought they should be evaluated on field experience, the university faculty were concerned their grades were inflated compared to regular methods. The attempts at integration helped to inflate grades because faculty members gave students the "benefit of doubt." If an instructor graded a paper outside her own content area, she was lenient. "I am not ever actually going to believe that I have the right to grade [an assignment] hard when it is going to affect hers [another class]." Faculty also had a difficult time evaluating assignments that were not of their own design.

The university faculty believed that instructors deserved and should command control over the curriculum and classroom decisions. The faculty were concerned that the students were trying to assume responsibility for decisions that the faculty should make. Students were seen as critical and demanding of faculty. They constantly tried to negotiate assignments. In a faculty focus group conversation about student input on curricular decisions, a methods instructor suggested that that faculty should be in control of these decisions. She started to temper her remarks by saying she may not be smarter than the students. Another instructor stopped her, "I am saying you are smarter

than they are. You have a depth and breadth of knowledge that you have had the opportunity to develop." The faculty valued empowerment of the students but as one SUMI student offered, "You told us we would become empowered and when we were, you didn't know what to do with it."

Many faculty members did try to share some control of the course curriculum with teachers by asking for suggestions or clarifications. Almost every semester, some of the professors who taught the cohort courses discussed their classes in school faculty meetings and offered to make changes. Only rarely did teachers take advantage of the opportunity. Some faculty also asked for help in scheduling field work. The teachers were more eager to help with schedules than with assignments.

A sense of community was valued by the faculty and also prominent in literature about Learning in Context. Faculty members wanted the students to develop a sense of community in their classes and at the schools. "I really pride myself in every classroom trying to have a sense of community." But faculty wondered if the sense of community developed with the schools worked against community in the university classroom. In a faculty focus group conversation, one member commented that SUMI students are sent to the schools and become members of that community. While that seemed to be a desirable goal, it had the consequence that the university faculty became outsiders. The faculty tried to be a part of the school communities but it proved to be difficult. The schools were forty miles away and the faculty had a host of other interests. The students noted the lack of faculty presence very loudly in focus groups. "That shouldn't be

allowed to happen. No way." The students did not understand why they rarely saw faculty in the classrooms. The teachers noted this in focus groups and in informal conversations as well. They knew the students wanted more faculty feedback. Both in focus groups and interviews teachers reported that they enjoyed seeing faculty in the halls and wished they could be in the schools more.

Information

University faculty seemed to use different sources of information in different contexts. In transcriptions from meeting notes and focus groups, faculty members called on personal experience as their source of information. Particularly in the focus group data, faculty talked about their experiences with the SUMI cohort, with other cohorts and classes, or even with different colleges. "I taught at a small private college... I followed them [preservice teachers] all the way through... and I don't think it has to be this adversarial." They used this information to make comparisons and set personal standards for their classes.

This project received a substantial subsidy from the corporate partner. The Foundation became a significant source of information for a few faculty. It was one element that was considered as new activities were proposed or grant extensions were being organized. This information came from a variety of sources. One source was an annual meeting of the education projects that were sponsored by this corporate foundation. Information also came from interactions with representatives from the Foundation such as what types of staff development or evaluation they were encouraging.

The grant was rooted from its inception in the Standards from the National Council of Teachers of Mathematics (NCTM). Virtually every reference in the original grant proposal was an NCTM publication. The mathematics standards were used as a guide for staff development and preservice teacher education. It was also intended by the author of the grant that education faculty members who taught cohort courses would include references to the NCTM Standards. The NCTM was considered so important that each year several faculty members, 3-10 teachers, and the SUMI undergraduates attended, and sometimes presented at, the national NCTM conference.

Articles from professional journals and conferences were important sources of information for faculty members. Leaders of Learning in Context as well as several other faculty members involved with SUMI traveled to professional meetings in teacher preparation. This information was used to confirm, or suggest changes, in the existing structure.

Among the most important sources of information were the school sites. The SUMI faculty members were consistently sensitive to what teachers and principals wanted or needed. My position as a school-based representative often involved relaying messages or serving as an advocate or translator for the schools. The needs and desires of the schools were so respected that they were sometimes accommodated even against the SUMI faculty members' better judgment. For example, experience had shown that it was not advisable to place a methods student in a field experience classroom with a student teacher. The teachers at Lincoln and Forest insisted they could accommodate both. The SUMI

faculty respected their opinions but, as they suspected, the arrangement was not as productive as hoped.

Institutions

Although the two faculty members involved in the grant operated in several institutional contexts, obviously the primary institutional environment for faculty was the university. The university set the parameters for faculty participation and the expression of the goals for the project.

The grant was submitted to the Foundation as a joint project between the schools and the university. The money was awarded to both. There was no institutional way to share responsibility. The money had to go to one and then be shared with the other. It was in the interests of the faculty for the grant money to come through the university. The schools became subcontractors. The university became the primary institution responsible for the budget, reports, and evaluation.

The faculty had to attend to other institutional issues as well. The mathematics educator was an untenured, assistant faculty member at the beginning of this project. The grant provided her with both advantages and challenges within the institution. It was to her advantage to be a co-principal investigator on a large grant but to her disadvantage that the project required an inordinate amount of time in the schools that detracted from her time to write and conduct research. The distance to the schools (over forty miles) and the volume of meetings in the school sites placed her in a tense situation.

The faculty did not operate within the institutional context of the district and schools but they had to constantly negotiate with them. The two SUMI faculty were very sensitive to the institutional environment in which the teachers and principals were working. For example, teachers' schedules are not as flexible as professors' schedules. As a consequence almost all meetings were held at the schools. The faculty frequently arranged their own schedules for the convenience of the schools. They also heard and responded to concerns that came from teachers. For example, when there were problems with the district paying tuition costs, the university fixed the problem for the teachers.

Discussion: Implications of Ideology, Interests, Information, and Institution on the Collaboration

Teachers, faculty, and students formed opinions and made decisions in different ways. They had different interests, information, and ideologies that were housed in distinct institutional environments. In order for this project to be successful, these have to be compatible or complementary. I will now examine each of the propositions and discuss the consequences of the 4 I's for each.

Mutual benefit

The schools, faculty and undergraduates must anticipate some sort of mutual benefit before they undertake such an extensive project. It required a commitment of time that was scarce in both environments. There had to be a pay-off.

Teachers felt a need for resources that could be immediately utilized. They wanted math manipulatives and activity books that could be injected into their curriculum without much change. They also appreciated the SUMI students and their contribution of "extra hands" or creative lesson ideas. In a set of interviews toward the end of the grant, teachers were unanimous in their appreciation of the resources and opportunities provided by the grant. They appreciated the materials but also the professional development courses. The courses were designed to be helpful and used textbooks, such as the practitioner-based Marilyn Burns book on teaching geometry, that validated practice and experience as a source of information. In many ways the project was successful in meeting the interests of the teachers.

There were ways, however, in which some of their interests and beliefs were not addressed. Teachers valued both their own and other teachers' experiences in the classroom. But teachers were not given many opportunities to share their own knowledge or learn from other teachers. Most of the classes and inservice opportunities were led by Midwestern faculty or district mathematics specialists. Teachers were not often provided the resources to visit other classes or share experiences.

The interests of some teachers were not mined by the professional development activities. Teachers valued student learning but this direct connection was not obvious in the flyers for mathematics courses. Professional development was marketed more toward mathematics content knowledge rather than student learning. The result was that the courses attracted people

who were already interested in mathematics or wanted an endorsement in mathematics. While this met the needs of a set of teachers, there were others whose interests rested elsewhere. The courses might have attracted a wider range if they had been more explicitly directed to student learning.

The institutional contexts contributed to this as well. The district was unable or unwilling for the grant to provide substitutes for teachers to observe, meet, and share. In addition, several teachers wanted a mathematics endorsement for which the state and university required structured classes carrying university credit. This placed the mathematics educator in the awkward position of always being a professor. There were many times in which she would rather have been a learner. For example, rather than being the teacher of a class, she expressed interests in participating in study groups and learning along with teachers. She was also concerned that university credits for mathematics education courses be as rigorous as any other university class. She was caught between a rock and a hard place -- if she taught algebra or geometry classes as they would be taught at the university, no one would enroll. If she watered them down, it was unethical to offer graduate credit.

The university students and professors' interests were met through placements that were, on the whole, respectful and productive. Students felt that they learned a lot from their field placements. The students were also welcomed into the Lincoln-Forest community. These placements were so successful that it presented a problem. The students bonded with the schools and became

resentful that the university impinged on that time. Their learning experience was centered in the schools, not at the university.

The university interest in evaluation was difficult to negotiate in the schools. First, the district expected the right to approve or change evaluation instruments administered to the faculty, elementary students or their parents. This occasionally led to delays and missed opportunities. The teachers had no interest in evaluation and confused evaluation with research. They resented the time spent during faculty meetings or planning time on responding to surveys or focus group questions. The suspicion among some was that they were donating their time for a professor to use them as guinea pigs. The grumbles were consistent. "This is taking my planning time. When am I supposed to plan?" The attempts to get evaluation data might have been more successful if they had played into the interests of the teachers. Teachers wanted the opportunities provided by the grant. Most, if not all, want the grant to continue. If evaluation had been linked to the continuation of these resources, teachers might have been more generous in their responses.

Shared research

The grant proposal sketched a vision of research by faculty, teachers, and SUMI students. For example, the SUMI faculty should assume an active research agenda in the schools. Small grants were available through SUMI to encourage such activity. Teachers were expected to conduct action research in their classrooms. SUMI students would take a class in action research and work with teachers and faculty to conduct research projects in the classroom. This vision

has been a challenge, however, since it runs into obstacles of interests, ideology, information, and institution.

The faculty at the university have research as one of their primary interests. A committee that evaluated Learning in Context noted that the College of Education was re-focusing on its place within a Research I institution. As such, research would gain a more prominent position. That might be expected to promote research on the SUMI grant but instead it has hamstrung it. First, research on practice and professional development schools is notoriously messy and time-consuming. It is often not valued by promotion and tenure committees or journal editors. Faculty may lean to easier, more respected topics. Second, faculty value their content areas. At the time this grant started, there was only one mathematics educator in the department. She inherited many of the professional development activities, preservice students, and project administration. It left little time for her to start a research project. In order to get involvement from other faculty members, the opportunities will have to come through their own content areas. It is highly unlikely that an educational historian will pick up a mathematics education research project. It would have to be related to their existing interests. In addition, the awarding of the grant mixed the Foundation's timeline with the university calendar. The grant was awarded close to the beginning of classes. Faculty members already had established their syllabi.

Teachers valued things that are experience-related and of practical use. In order for research to be attractive to them, it has to use their experience and have

some value for classroom application. An action research project is being developed by the SUMI mathematics educator that is designed to meet classroom teachers' needs. Teachers will be paired with faculty members on projects of the teachers' design. The faculty members will do the writing. This serves the interests of the teachers for something that is experience-related and practical. The faculty members get to work with a teacher and develop a research article. One issue that may need to be addressed is a resource issue -- time. Since the schools and district do not value research projects, teachers will have to do this work on their own. This comes at a time when the district has increased teaching time and reduced planning time.

The SUMI students took an action research course as part of the Learning in Context program. Their evaluations of the experience were predictable: they liked the practical orientation but resented time away from the classroom. If this experience was to be improved for them, the course might be placed in a different semester so they can use the project to inform their practice. The course was isolated from any other field experience and was sandwiched between their intensive methods semester and student teaching.

Shared teaching and responsibility for preservice education

The SUMI project and Learning in Context are based on the premise that the education of preservice teachers takes place both in the schools and at the university. One recent university document, proposing another Learning in Context site, stated, "Collaboration is a basic assumption implicit within the project... Instruction should be a shared responsibility." The university

continues to value the participation of the schools in the education of preservice teachers.

One area in which to collaborate is in teaching. Shared teaching takes on many possible forms. Teaching could be shared at the schools with the elementary classrooms. Teaching could be shared in the preservice classrooms. Sharing might involve simply having a guest from the other institution teach a single lesson. At the other end of the spectrum, it could involve sharing or assuming the responsibility for the class.

Teaching was shared in two ways. Both university and classroom teachers guest taught in each other's classes. The faculty interests in this were varied. First, it constituted "service" in the tradition of a land grant institution. Second, it could be used to fulfill a forty-hour requirement that faculty have to perform if they taught in the professional sequence for preservice teachers. Finally, it met the goals of the grant and could be reported as a milestone to the Foundation.

Guest teaching in university classes made teachers feel that their abilities were valued by the university although it usually made them nervous. The presentations that they gave often mirrored their own interests and values. Most of their lessons were practical, "make and take" activities. For example, two kindergarten teachers gave a lesson on centers in the primary grades. After the undergraduates went through the centers, the teachers told them how to prepare them and how much the materials cost. This met the self-interests of the preservice students who valued experience and things that were practical.

There were attempts to establish co-teaching at the university but they did not work out. We were dedicated to co-teaching because we felt it was truly collaborative. The university and school-based teacher could help to bridge the gulf between theory and practice. The logistical and institutional problems proved insurmountable. First, the schools did not consider university teaching as part of their job, so the class would have to be taught after contract hours. This was a hardship on the teacher who would have to commute two hours to the university after a full day at work. Second, the university could not pay two people and count it toward the load of the faculty member. That meant the faculty member would have to pick up another class. In order to co-teach the faculty member would lose research and writing time. Consequently, it would not be in their interests.

Co-teaching might also compromise some of the interests and values of the SUMI students. While it would validate their ideas of experience and practicality, it could detract from some of their other interests. The teachers would, in a co-teaching situation, become evaluators of the students. This might make the relationship between students and teachers less congenial. The faculty felt that the power to give grades interfered with their bonds with the students. Students might also feel more competition with each other at the school site. This would violate their vow of equality. So while all three groups might pay lip service to the ideal of co-teaching, there are interests, ideologies, and institutional variables that make it untenable.

There remains the broader goal of sharing responsibility for preservice teacher education. This ideal became tangled in a web of interests, ideologies, information, and institution. Some of these issues support shared responsibility and others make it a challenge.

The students' interests, ideologies, information and institutional identity were largely compatible with sharing responsibility with the schools, and university. They already valued the school experience and teacher wisdom. That became part of the problem. The students entrenched themselves in the school experience and started to reject information and values coming from the university. This could serve to make students even more conservative. So while the program becomes restructured, it does not become re-normed. The students would value this as an apprenticeship.

The demands of sharing responsibility for a preservice program would strain the resources of a school. Educating preservice teachers is considered a professional service but not part of their job. Attending meetings, supervising students, and teaching courses on top of their regular duties would be backbreaking. There was a case that illustrates some of the difficulties. During the methods semester, a student in desperate need of organizational skills was placed with a teacher who excelled in organization. The teacher was aware of it and felt flattered that she had a skill that was valued by the student and faculty. This met her need for respect. Unfortunately, the student did not learn from her. He neglected to plan lessons, played computer games, and balanced his checkbook in class. He was detracting from the classroom teacher's need for her

own students to learn. After numerous interventions, she asked me to remove him. She was adamant that it was not her decision. She did not want control. It was the *university's job* to remove him. The university had an interest in placing him with another teacher but both the principal and other teachers refused to have him. If another teacher accepted him, it would have created dissension. Since teachers valued congenial and equal relationships, the student had to be removed. The teacher did not want the responsibility of ending this young man's career. It was not her job and it would interfere with her relationships with the other SUMI students.

The university faculty are also in a difficult position. Shared responsibility meets their needs for student placements and research possibilities but it also conflicts with their need to control and "cover" content. As students are placed longer in the field, they have less time in classes. Assumptions that the students will make up for lost time in the field have not materialized. Sometimes less is just less, not more. Partnerships also require an inordinate amount of time to nurture and maintain. Until the institution values this time, it is not in professors' interests to participate.

The grant worked, as much as possible, with existing interests, ideology, information, and ideas of institution. There was no overt attempt to re-form them. Instead we used existing values to construct a collaboration. The teachers still valued resources and things to use tomorrow. The faculty remained in control of the preservice curriculum and research. Some things improved. Most teachers had more resources and some improved their understanding of

mathematics and mathematics teaching. The changes were incremental, however, and served to reinforce versus challenge or change existing values. As such, the project may subvert the opportunity for more fundamental changes.

Implications

Simultaneous change in schools and the university is immensely complicated. As Teitel points out, "To be effective, university-school collaborations not only have to change two institutions (each of which is strongly resistant to change in its own right), but they have to change the nature of the ways those institutions work with each other: how they make decisions together to take a shared responsibility for teacher education" (1997, p. 116). These changes must consider the dynamics of interests, ideology, information in two institutional frameworks. This study confirms the complexity of this undertaking. But acknowledging the inherent complexity is just the tip of the iceberg.

This paper has shown that a change in structure does not lead to a change in interests or ideology. Instead of starting with restructuring, the SUMI participants needed to put blood, sweat and tears into reconceptualizing practice at both the school and the university. Structural change in isolation from reconceptualization will did little more than reinforce the status quo. For example, the expanded preservice field experiences were conceptualized in much the same way as field experiences in the regular program. SUMI students just got more practice. The same conservative effect applied to faculties at both schools.

Teachers still valued "stuff" and faculty maintained control over the preservice curriculum. While structural changes were difficult, the more challenging work of reconceptualization was largely ignored.

Where would such a profound change start? We often hear of "top-down" or "bottom-up" reform. The project described in this paper may have been "side-ways" reform as we worked from the margins. But perhaps the most important direction is from the inside-out. Simultaneous renewal must start with a reconceptualization by both groups. Wanting improvement and changes in structure, process, or training will not be enough without a change in the conceptualizations that underlie current practice.

Was Haberman right? Is it impossible for schools and universities to work together? Clearly this paper, as well as many other studies, suggests it is a profoundly complicated affair. If the 4-I's are only negotiated and accommodated, there will be no fundamental change. But if the 4-I's are not considered, a massive collision is probable. Is there another option? Yes, but it requires that we make a profound change where it is most difficult but also most lasting -- in ourselves. Unless our own values change, the structural changes of a university-school partnership will be full of sound and fury.

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GENERAL CONCLUSIONS

In this series of papers, I examined connections between preservice teachers, teachers, and university faculty engaged in a university-school collaboration. The first paper detailed the effects of expanded field experiences on a preservice cohort. In the second paper, I again tackled the subject of preservice cohorts but from a content-specific perspective of mathematics and science education. The last paper addressed the issues from the perspective of interests, ideologies, information, and institutions involved in a complex university-school collaboration.

Despite the variety of topics and perspectives the papers covered, they all pointed in similar directions. First, the connections that the university-school partnership were attempting to forge were very complex. They involve different institutions, each of which is complex by itself. As Tyack and Tobin (1994) pointed out, the organizational framework provides a "grammar" to the structure of schools and instruction. But the grammars of universities and schools are different. The two may not mix without significant restructuring.

This restructuring is what Cuban (1988) referred to as second order change. Second order changes "reflect major dissatisfactions with present arrangements" (p.342). Second-order changes look to transform, rather than tweak, how things are done. The idea of *simultaneous renewal* (Goodlad, 1994), characteristic of the goals of professional development schools, is a second-order concept. "Collaboration should transform the school and university cultures" (Bullough,

Hobbs, Kauchak, Crow, & Stokes, 1997, p. 85). Have the changes described in this university-school collaboration altered the existing structures? They have not. The schools look and operate much the same as they did before, albeit with more "stuff." The same is true of the university. Indeed, Cuban suggested that there must be social or political changes outside the schools to force a second-order change. It is not clear that there is a significant social force acting for these kind of changes. Have there been first-order changes? Yes, there have been changes in the preservice teacher program. Some of these, such as students feeling supported, have been improvements. Others, such as their identification with the schools, had negative consequences as well. Indeed, some of the changes described in these papers have reinforced existing practice rather than changed it. For example, the extended field experiences of a preservice cohort resulted in a greater attention to existing practice rather than a thoughtful integration of university coursework and classroom experiences. This, Cuban suggests, is characteristic of first-order changes: they support the status quo. There have also been changes in the schools. But these changes are largely in the form of satisfaction with an increase in materials and other resources. This reinforced existing interests rather than changed them.

It is easy to become pessimistic about the chances for major changes in schools and universities. Both Sarason and Cuban argue against such a feeling of impotence. But clearly, reformers need to understand what they are up against. Some changes may be even be impossible in existing institutional environments. Reformers must approach their agendas with a solid dose of

clarity, purpose, and a thorough understanding of the forces at work. Otherwise, attempts at reform risk creating resentment and cynicism. Neither of those emotions will bring us the schools we need.

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